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ADVANCES IN THE INSTRUCTION AND REQUIREMENTS AT THE PHILADELPHIA COLLEGE OF PHARMACY.

By Joseph P. Remington.

A very general desire, on the part of the friends of pharmaceutical progress and the graduates of this College, to be made acquainted with the details of the recent changes made in the requirements for pursuing the courses of instruction, and on the part of the students to know something of the earlier history of the College, has resulted in the preparation of the following brief records of progress; which, whilst not attempting to thoroughly cover all of matters of interest occurring within the times treated of, will probably serve to throw some light upon the interesting period embraced in the last two decades of the history of the "first institution established in America for disseminating a knowledge of Pharmacy." The early years of the College were marked by trials and difficulties, common to the career of all similar efforts to elevate an art or profession, into which many abuses had crept.

Apathy and indifference, or downright opposition, on the part of the majority of the druggists of the city, was then the rule; but the self-sacrificing efforts of such men as Charles Marshall, Daniel B. Smith, Henry Troth, Peter Lehman, Charles Ellis, Stephen North, Peter Williamson, Samuel F. Troth, our President, Dillwyn Parrish, and others saved the life of the young College.

As years rolled on, the institution gained strength, the greatest improvement being shown, however, during the last twenty years. The appreciation of the opportunities extended for pharmaceutical advancement by the pharmacists of the United States may be shown by the number of matriculants who have enrolled their names during this time; and, with the view of showing the record as condensed as possible, the tabular form has been adopted.

Year.	Notes and College Events.	Number of matriculants.	Percentage of matriculants from Pennsylvania and neighboring States.	Percentage of matriculants from distant States and countries.
1860.....	Faculty at this time: Prof. Bridges, Prof. Procter, Prof. Thomas.....	125	78	22
1861.....	Opening year of the Civil War.....	121	77	23
1862.....	Falling off of the Class.....	91	88	12
1863.....	Dark days of the War.....	74	91	9
1864.....	Death of Prof. Thomas; Election of Prof. Parrish; slight recovery in attendance from effects of the War.....	93	86	14
1865.....	Founding of the Alumni Association; gradual increase in attendance.....	104	84	16
1866.....	Prof. Procter resigned; Prof. Maisch elected to chair of Pharmacy.....	133	80	20
1867.....	Transfer of chair of Pharmacy to Prof. Parrish, and Materia Medica to Prof. Maisch; Summer Course in Botany established.....	154	80	20
1868.....	Old College building on Filbert street sold; new building on Tenth street erected.....	152	80	20
1869.....	Fees for College tickets increased 50 per cent.; attendance increased.....	179	79	21
1870.....	College Laboratory established; Prof. Maisch appointed Director.....	197	79	21
1871.....	Oral examinations for candidates for graduation abandoned; systematic written examinations substituted.....	198	70	30
1872.....	Increased accommodation provided for students; death of Prof. Parrish; re-election of Prof. Procter..	237	65	35
1873.....	Certificate of Proficiency in Chemistry and Materia Medica issued to graduates from wholesale stores.....	293	68	32
1874.....	Death of Prof. Procter; Prof. Remington elected.....	251	70	30
1875.....	Increased attendance; improvements in lecturing facilities.....	270	67	33
1876.....	Centennial Year; first presentation of Procter Prize...	294	63	37
1877.....	Opening of Operative Pharmacy Course; Prof. Remington, Director; examinations in Practical Pharmacy inaugurated.....	265	63	37
1878.....	Graded Course; Junior and Senior established; office of Actuary created; Thomas S. Wiegand elected.....	316	69	31
1879.....	Resignation of Prof. Bridges; election of Prof. Sadtler	334	72	28
1880.....	Professor's Prizes instituted: property on Elwyn street purchased.....	332	69	31

Year.	Notes and College Events.	Number of matriculants.	Percentage of matriculants from Pennsylvania and neighboring States.	Percentage of matriculants from distant States and countries.
1881.....	New building erected on Elwyn street, doubling the facilities; Assistants to the Professors appointed to review the lectures; Prof. Power elected Director of Chemical Laboratory; Class instruction in Analytical Chemistry established.....	367	64	36
1882.....	Practical Course in Microscopy instituted by the Alumni Association; A. P. Brown, Ph.G., Instructor	370	68	32
1883.....	Prof. Power resigned; Prof. Trimble elected to assist Prof. Sadtler in direction of Chemical Laboratory....	443	67	33
1884.....	Preliminary Junior Examinations established.....	543	63	37

The figures in this table show a steady and gratifying increase, the percentage columns indicate the gradual evolution (somewhat intermittent, it is true), which shows the *national* growth of the College, the percentage of matriculants from distant States and Territories being 22 per cent. in 1860 and 33 per cent. in 1883; the highest figures being exceeded in 1884 and 1876, the Centennial year, when 37 per cent. was reached, and the lowest percentage of distant matriculants was shown in 1863, when 9 per cent. is recorded, this during the civil war. A further examination of the table will reveal the effect of each advanced step taken in the course of instruction. As progress was made, and the standard rapidly elevated, a check in the growth of the class may be noticed in the year immediately following, but in the succeeding year the increase is evident, and the check shown to be but temporary. The twenty-five years noted in the table beginning with 1860, give a fair indication of the educational labors of the College.

The beginning of that notable decade in our national history which embraced the great struggle for the supremacy of our Union, found the Philadelphia College of Pharmacy in a growing and prosperous condition, the debt on the old building on Filbert street was being gradually extinguished, the finances were carefully husbanded, and the Sinking Fund gradually increased under the persistent care and watchfulness of the chairman, Samuel F. Troth. The breaking out of the war, checked at once the growth of the classes, and in the three

years succeeding (1862, 1863 and 1864) the great and stirring events of these memorable times greatly overshadowed, in interest, the lesser circumstance of obtaining an education.

The close of the war was marked by an event of great importance to the interests of the College; in 1865 the Alumni Association was founded, and this organization proved to be in subsequent years a great element of strength to the Institution. The year 1866 was also a memorable year, Professor Procter at that time, the acknowledged leader in his profession, felt obliged on account of ill health to resign his Chair of Theory and Practice of Pharmacy. He was succeeded by Professor John M. Maisch; the entrance of Professor Maisch into the Faculty was announced in the "American Journal of Pharmacy" by Professor Procter with the following notice: "We know of no one who can bring to the task involved in this appointment so large a share of practical and theoretical knowledge as Professor Maisch, and we doubt not, he will give his best efforts to the promotion of the school, and the advancement of the important branch, he has been chosen to illustrate."

In the year following (1867) a transfer of chairs was made between Professors Parrish and Maisch—the subject of theoretical and practical Pharmacy was more congenial to the tastes of Professor Parrish than that of Materia Medica, and the zeal and ability which has since characterized the labors of Professor Maisch in the department of Materia Medica leave no room for doubt that the transfer was thoroughly satisfactory on his part. The title of the Chair was now changed by the addition of the word "Botany" to "Materia Medica and Botany," and the significance of this change is appreciated by the junior student even to the present day. In the same year a summer course in Botany was established. At this time the inadequacy of the accommodations of the building on Filbert street became so apparent that an improvement was imperatively demanded. A building committee was appointed, the old building on Filbert street was sold and a much larger edifice on Tenth street erected. Although the friends of the College nobly responded to the call for pecuniary assistance in aid of the building fund, it was found necessary in the year 1869 to raise the fees for College tickets in order to meet the increased expenses of carrying on the instruction. The fears of some of the members of the College that this would greatly decrease the attendance were proved to be groundless, for the attendance was not even temporarily decreased,

but on the other hand it increased 18 per cent. The year 1870 was marked by the establishment of a College laboratory and the election of Professor Maisch to the directorship. The long cherished wish of the younger members of the College and of the Alumni was thus accomplished as the following resolutions adopted by the Alumni Association, five years before (1865) clearly show:

WHEREAS, As graduates of a time-honored Institution, we feel the warmest interest in its future welfare and usefulness, and deem it no less a privilege than a duty to use every effort to secure for our Alma Mater the position to which she is entitled, and

WHEREAS, Many of us have long cherished the idea of establishing a Practical School in connection with our College, where the branches of Pharmacy and Chemistry might be more thoroughly acquired, therefore,

Be it Resolved, That a Sinking Fund be created for this purpose, out of the surplus funds of the Association; and that a committee be appointed by the Executive Board, to be known as the Trustees of Sinking Fund, whose duty it shall be to take charge of and solicit subscriptions to this fund, and invest the same as they may judge safe and profitable, until a sufficient amount shall have been acquired to aid in the accomplishment of the end in view.

In the next year 1871 the method of conducting examinations, orally, which had been in operation for nearly half a century, was abandoned, and thus passed away, one of the most imperfect methods of examination that was ever devised. Although the oral examination of the candidates was conducted by the Faculty and Committee of Examination in a fearless and conscientious manner, the faults of the *method* were too apparent to be overlooked, and it had to give way to a systematic plan whereby each student wrote the answers to the same questions upon paper and handed in the results within a given time. Professor Parrish who had long advocated this change in the method of examination did not live long enough to witness its advantages—he died during the next year. 1872 witnessed the recall of Professor Procter from the period of rest that he had enjoyed, and he was re-elected to the old chair, that he had resigned in 1866, his health, however, had not been re-established, he passed away suddenly on the 11th day of February, 1874. The present Professor of Pharmacy was elected in the same year to fill the vacant chair.

1876, the Centennial year, was a memorable one for the College—the building was thrown open to pharmaceutical visitors and strangers, the cabinet received many valuable accessions and the class was con-

siderably increased. In 1877 the present Operative Pharmacy course was inaugurated; the course was optional, and at first the number of students who accepted the opportunities was small, and the facilities were limited. Professor Maisch tendered the use of the chemical laboratory on certain afternoons, and the course was conducted by the Professor of Pharmacy. The examinations which had each year increased in severity, received in 1877 an additional impulse in the inauguration of the examinations in practical manipulations; this advance was deemed necessary, in order that the worth of the graduates of the College should be enhanced, by compelling them to pay especial attention to excellence in conducting pharmaceutical operations, and it had the effect of at once improving the practical worth of all students who attended the College. A great advance was made in 1878 when the graded course of lectures was established. The following extract from the minutes of the Board of Trustees fully sets forth the changes:

1. The instruction to the junior and senior students will be arranged, with perhaps slight modifications, according to the plan which received the sanction of the "Conference of the Schools of Pharmacy" in 1876 (see "Amer. Jour. of Phar.," 1876, p. 471); in the junior department, therefore the elementary branches will be taught, which will hereafter be omitted from the senior course, thus affording more time in the latter for necessary details and a more extended range of instruction.

2. There will be six lecture hours per week for each class, the same as for the undivided class heretofore. The lectures to the two classes will be on alternate days so as to afford the professors ample time for preparing the necessary specimens, apparatus and experiments in illustration of the lectures.

3. Near the close of February an examination of the junior students will be held; the examination for the degree of Ph.G. will, as heretofore, take place early in March.

4. For admission to the senior course the juniors will be required to successfully pass the examination in each branch; those failing in one or more branches in February, will be granted another examination towards the end of September previous to the beginning of the lectures. Students who have attended one course of instruction in some other College of Pharmacy, before entering the senior course, will be required to prove that they have passed, at such college, an examination in all the branches taught to the juniors, or submit to the examination in the autumn.

5. Students who, previous to the beginning of the lectures in October next, may have attended one full course of lectures in this or another College of Pharmacy, will be entitled to admission to the senior course without previous examination, up to and including the lecture course for 1880–1881.

It will be observed that the adopted modification will vastly increase the

labors of the Professors, but at the same time afford the students still greater inducements for systematic study and the opportunity of obtaining a more thorough professional education than heretofore.

Probably no change has ever been made in the college methods, which has proved so thoroughly satisfactory as this, the scope of the instruction in each department was doubled, and the student found that from the opening lecture, the instruction grew in depth, character and extent, until the closing one was reached. The effects upon the class were immediate and of great benefit. The increased attendance of students made it necessary in this year for the College to create the office of Actuary; Thomas S. Wiegand being elected to this important position. In 1879 the greatly respected Senior Professor Dr. Bridges, was compelled on account of ill health to resign his active duties. The Chair of Chemistry was filled by the election of Prof. Sadtler, the present incumbent. The wisdom of this appointment has never been questioned. The growth of the classes, and particularly those of the optional courses, Pharmacy and Chemistry, caused the Board of Trustees to consider some means for the enlargement of teaching facilities. Fortunately, the properties in the rear could be purchased, and plans were made and estimates furnished for the erection of a four story building, adjoining the one which had been in use for eleven years, and which the classes had outgrown. This was accomplished in 1881 and the capacity of the College was thereby doubled. A special room was set apart for the Pharmaceutical laboratory adjoining the Pharmacy Lecture Room, and the Chemical Laboratory was enlarged and refitted. Professor Power was elected Director, and the system of class instruction in Analytical Chemistry was inaugurated. The year 1882 witnessed another advance in the instruction in the establishment of the optional course in Microscopy, this was effected largely through the efforts of the Alumni Association. Mr. A. P. Brown a graduate of the College and a practical microscopist was elected director. In 1883, Professor Power resigned his position as director of the Chemical laboratory, to accept the chairs of Pharmacy and Materia Medica in the University of Wisconsin, and the Chemical laboratory was placed in charge of Professor Sadtler, Professor Trimble being elected to assist in the direction.

The year following (1884) a practical examination in analytical chemistry for candidates for graduation was instituted, and the preliminary junior examinations just established, brings this brief history

of the changes and improvements within the last 24 years up to the present time. The last important advance is the establishment of the preliminary junior examinations; this plan received the sanction of the Board of Trustees in the early part of this year (1884) and is now on trial. It was entered into after a thorough and careful review of the methods employed in the various technical and literary institutions of learning in this country. The mode of conducting ordinary preliminary examinations, as practiced by many colleges, was not believed to be suited to the needs of a College of Pharmacy, the requisite qualifications of a good pharmacist, embrace not only good intellectual acquirements and a sound elementary education, but a peculiar adaptation for the duties of the profession of his choice. A graduate of Yale, Harvard or Cornell, would probably make as good a practical pharmacist as a graduate of a first-class academy, but he is hardly likely to be any better—whilst an enthusiastic energetic plodder after the truths of physical and chemical science, who is blessed with a good brain, an observing eye, quick perceptions, a retentive memory and a steady hand, even if his early advantages have been limited to a good common school education has as good a chance in time to become eminent in his profession as his more fortunate colleague.

The amount of knowledge possessed by a student is not a measure of his practical worth in the world, *but the amount of knowledge that he can successfully apply*, is. The great evil of our present systems of education particularly with many of the higher order, is, that young men are not taught "how to do *their own* thinking;" lines of thought are laid down for them, rules and rigid theoretical methods are to be committed to memory, and if a case occurs out of the regular routine which calls for a practical application of the very principles that they have been studying so long, they are completely at a loss and wander hopelessly. This unfortunate oversight in education has been the means of bringing the graduates of some of our best literary colleges into disgrace, in the eyes of practical men (particularly journalists), who continually and often unjustly sneer in the public prints at the available worth of these sorry victims of a defective system. The Faculty of the Philadelphia College of Pharmacy have always recognized the value of a practical application of knowledge, and this writer willingly bears testimony to the habit which is always exercised by the examiners of giving a candidate a higher mark for the answer to a question which is correctly rendered in the applicant's own language than if the exact

words of the text-book were used *verbatim et literatim.* Questions are framed which compel the student to use his own words and do his own thinking, and he is thus trained for subsequent examinations to expect such questions, and this is a direct incentive to original thought. At every step in a process he is trained to ask himself the question: why is this? This method of instruction led to the establishment of a plan for auxiliary instruction, which has been one of the most valuable advances that this College ever instituted; *i. e.,* the appointment of competent assistants to the professors to act as quiz masters; these gentlemen meet the classes immediately after the lectures and systematically ask the members of the class, questions upon the subjects of the lectures delivered by the professors, and the great value of hearing the facts of a subject repeated in a different way, from different lips a week after the lecture was delivered, and following the necessary individual study of the subject, fixes the facts upon the mind of the student ambitious to obtain knowledge, in a way which will be of lasting value to him in after life.

Every effort is made to break up the pernicious system of "cramming for examination" and it is impossible for a student to obtain a good record, who is a mere memorizing machine; the subjects must be comprehended in order to win the coveted prizes. As it is of the utmost importance to the student, and to the best interests of the College for the applicant to know just exactly what is expected of him in the outset of his collegiate course, it was deemed far better to take a longer time than is usually given to preliminary examinations, and in order to thoroughly and properly test the student's fitness to become a pharmacist, he is first given the opportunity of listening to two months lectures; during this time he becomes acquainted with the distinctive method of instruction adopted by the Faculty, and is then subjected to an examination. This "*preliminary junior examination*" is so conducted that the scholarship of the student is ascertained at the same time that his ability to master the subjects that he is expected to grasp is. His arithmetic, orthography, grammar, powers of composition and expression, penmanship, etc., exhibited in the answers to his questions and grouped under the heading "scholarship," determines the candidate's fitness to pursue his studies, if he has shown a deficiency in scholarship he is not permitted to take the next examination, but must make up his deficiencies and be re-examined at some future time, at least a year afterwards.

The principal advantages of this method over the ordinary preliminary examinations lie in the fact that the College is furnished with better students, and the student is more *justly* treated, he is not given an examination on subjects which have no connection whatever with the particular branch of science that he has elected to study; *but his fitness to study Pharmacy is proved by an actual practical trial of his ability to master the elementary portions of the pharmaceutical subjects that are taught in the College.* If his ability is proven and he passes the examination successfully, his labor does not go for naught, but the record that he makes has a bearing in determining his fitness to enter the advanced or senior class. In this way the advantages of the progressive system of teaching Pharmacy are realized, and the student has the opportunity of ascertaining, in the outset of his career, whether his chances of becoming a good Pharmacist are cheering enough to warrant the further expenditure of time, labor and money or not. An examination in the ordinary English branches of education *alone* can never give him this knowledge, for he might pass an examination in these perfectly, and yet fail absolutely in a pharmaceutical examination.

PRELIMINARY EXAMINATION.

By Andrew Blair.

This subject has been receiving much attention of late, and is one that deserves more than has been given to it. The popular demand of the day is "Elevate the Standard of Education," especially in the various branches of science. This certainly is very proper, and in fact, necessary in such an age of progress as we are now enjoying. The methods employed to reach the attainment of this may, in some cases, be the most suitable and efficient, while in others more or less defective. These remarks will offer a few hints that may or may not be an improvement on present usages, in either case to provoke some discussion on the subject which shall result in a genuine and substantial elevation of the standard of education of the Pharmacist.

What should a Pharmacist be? While it is proper and essential to prosperity and substantial success that a man in any and every calling should be honest, industrious, possessed of good morals, faithful and true in his representations and practice, it is eminently so with the Pharmacist, and he should be a man intelligent and qualified in the details of his calling, not necessarily reaching deep down into the long

range of scientific research. He should have a stock of general information, gathered by observation as well as from practice, experiment and print in its various forms, much of which may not bear directly on his calling, but the possession of which may often assist him in applying ideas and working out methods or processes that may be valuable to him.

Why does he become a Pharmacist?

Ask the young men in any of the classes of our schools of pharmacy and most likely every one will answer "To earn a living." This is certainly a very commendable motive, and if the party shows a fitness for it he should be encouraged by all proper means. Schools of Pharmacy are established in various parts of this country as well as Europe to educate young men in the different branches of the sciences required. As a rule these are in the habit of accepting all applicants who are willing to purchase the necessary tickets. No question is asked as to the fitness or capacity of any applicant to receive and be benefited by the instruction to be given him. If he has not any preliminary ideas or knowledge of the subjects or substances to be discoursed upon, how can he receive, retain and digest the matter to the extent it is proper and necessary he should. Here is where and when the preliminary examination should be required. Many of the young men who attend these schools have had no practical or preliminary training whatever. They attend the lectures, purchase and surround themselves with every book of reference offered, and if they have retentive memories pass a successful Junior examination, and the succeeding winter repeat the dose, with the difference that it is a degree higher, and the parchment is secured. It may be claimed there are practical departments attached to these schools; what of that? Two or three hours a week, for four or five months of a winter season, to be a substitute for the constant drilling (as in olden times) of the pestle and mortar, by the hour, or the grinding of roots and drugs by the half-day. Place a young man at a prescription counter after such a course of studies and what is his *practical* worth? An answer is hardly necessary, as many employers who will read this have had experience and can answer it for themselves.

At once we are confronted with the assertion that all who desire to learn have not and cannot obtain the practical experience of a proper kind, and it may be so. Is this any reason that such should be crammed theoretically only, and on the day of graduation placed side

by side with those thoroughly drilled in the rudiments and practice of the profession, and proclaimed before the world as equally competent and qualified to follow their chosen calling the one with the other? As has been remarked, the chief object of the education, is to "make a living." It is the practical side of the question which certainly carries the most weight.

Again it is declared that no young man is allowed to graduate till he has had a certain practical experience with some qualified apothecary. Are the character and quality of these certificates ever examined into? Is the question asked if the party giving the certificate of experience is a qualified pharmacist, or a dry goods merchant, with a few bottles in one corner of his store; or a general country storekeeper with about the same complement of drug store requisites as the dry goods man. Some may say it is impossible to learn such facts. Not so, when we have State organizations in almost every State in the Union, the officers and members of which are reputable Pharmacists.

What is the general result?

The country is supplied with Pharmacists—good, bad, and worse.

The institution, whose certificates of proficiency they hold, is extolled or degraded as they (the holders of them) show to the world their real worth based on the training or education received.

In other words, this grinding out of young men as graduates is a mistake in more ways than one, and always the community and frequently the graduates are the losers by it.

What is the remedy? No, we will not call it that, but ask can any system or method be suggested to improve this condition of things?

What are the objects of the schools of Pharmacy?

Is it to create a class of men, morally, practically and scientifically fitted to assume the responsibilities of and conduct a profession that holds the lives of the community within their grasp, who are to be trusted for their integrity and ability to supply such things as are honest and proper, intended to heal the wounds of the suffering and cure the disease that is wasting life away; or is it to turn out as "many" as possible, regardless of such or like considerations? If the first sort or class are to be the character of those educated, then sort out the material from which they are to be made. How? When young men apply for their tickets for a Junior course, require them to pass a preliminary examination in the rudiments of the branches they are to study (the result of their two or more years' experience with a quali-

fied Pharmacist), in addition to the evidence of a good school training, which must also be accompanied with a certificate that the applicant has been employed for two full years with a qualified Pharmacist, and has shown a fitness for and application to his calling that warrants his entering on a course of studies to perfect himself in his profession. The standing of the author of said certificate to be ascertained from the State society where he holds forth, in case he is not known to the College authorities where the application is made.

Arrange a course of study which shall result in a thorough and practical knowledge of the rudiments and scientific details of the profession without compelling an acquirement of extreme scientific investigation which will be of little practical advantage to those who wish to follow pharmacy as a means of livelihood. If some wish to follow the scientific, let them have the opportunities of special instruction, but do not oblige every student to follow it in order to gain his diploma as one competent to select drugs, compound properly the same and dispense them in proper shape and quality to answer the purpose for which they are intended.

FURTHER CONTRIBUTIONS TO THE ANALYSIS OF MALT EXTRACT.

By J. F. Carl Jungk, Fremont, Ohio.

The analytical methods recommended by me in the paper communicated to the June number, 1883, of this Journal, have been largely used in the examination of malt extract in Europe, as well as in the United States, and some have criticised the method of determining diastase as not being precise enough. My object in publishing the method of examination of malt extract at that time was principally to show those inexperienced in analytical work a way for determining, in an easy manner, the presence of diastase. This I believe has been at least partly accomplished, as in a number of commercial malt preparations in which diastase could not be detected before it has been subsequently found, although not in such proportion as might be expected. The following treatise is somewhat more detailed, but intended more for those who are acquainted with the various analytical manipulations. Familiar methods of determination will, therefore, only be referred to.

A malt extract prepared with sufficient care will always transform the same amount of starch in the same time as the malt which has been used for its preparation. For the purpose of comparison of the diastatic effect of a good malt extract we must first determine the diastatic effect of a good malt.

Commercial malt varies greatly in quality. If we take into consideration only well-looking malt we shall find that, although its appearance allows the inference of its being of the best quality, it nevertheless varies greatly in its diastatic effect. Malt is met with which will transform its own weight of starch in 2 minutes at 100°F., and 5 times its weight in 7 minutes at 150°F., while other malt, at 100°F. will require 7 to 10, or even 25 minutes for the conversion of its own weight of starch, and at 150°F. for the transformation of 5 times the weight of starch will need 27 to 120 minutes. Now, if a malt extract be met with which will change its own weight of starch in 2 minutes at 100°F., or 5 times its weight in 7 minutes at 150°F., it is to be regarded as an excellent preparation.

The mauufacturer cannot always secure malt effective in 2 and 7 minutes, as indicated, and, therefore, in simple justice, the time should be fixed at 5 and 18 minutes respectively; that is, a malt extract which will change its own weight of starch in 5 minutes at 100°F. or 5 times its weight of starch in 18 minutes at 150°F. should be regarded as good. This requirement is not too severe, and therefore all extracts which do not come up to this standard should be rejected as poor preparations.

Examination of the Malt.—For this purpose I use 1 part of malt, ground fine, to every 5 parts of starch, which has previously been boiled to a paste with 125 parts of water, and determine the time which is necessary, at a temperature of 150°F., to change the starch; that is, until the liquid ceases to acquire a red color upon the addition of iodine. A good malt, and a properly prepared malt extract, will require for this change from 7 to 18 minutes. Using the malt as a fine powder, or previously extracting it, will make no difference in the time requisite for the transformation.

A malt which will transform 5 parts of starch in 7 minutes at 150°F. requires for 10 parts of starch 20 minutes at 150°F.; for 20 parts of starch 70 minutes at 150°F.; for 1 part of starch 2 minutes at 100°F.

Now, if we accept these figures as a basis, we can easily express in figures the value of a malt extract with respect to the diastase.

Malt Extract; Determination of Diastase.—Among many technical analyses I have performed 248 analyses of malt extract. The extract was prepared by me, using 120 bushels of malt, 34 lbs. to the bushel, in each case, the malt being previously examined as to its diastatic value. The figures given further on represent the average of these 248 analyses.

The method frequently followed of allowing the malt extract to act from 12 to 24 hours on a large amount of starch should be rejected, because the changes occurring hereby are not always caused by the diastase; for instance, the generation of acid, which increases steadily, takes part in the transformation of the starch; further, the decomposition of the nitrogenous bodies, which interfere with the action of the diastase, or may altogether destroy it. It is certain that this change takes place quicker in the human stomach:

1. Because the transformation of the starch is in part effected previously by the baking and boiling of our food.

2. The transformation products are speedily absorbed in so great a measure that thereby the diastatic effect is accelerated.

3. In the process of digestion acids are produced, which support the action of the diastase until the amount becomes too great, after which the diastase is destroyed, and the acids act only on the nitrogenous bodies.

The diastase acts on starch paste very quickly, and the time required, therefore, is only to be reckoned by minutes. Such action should continue no longer than 1 hour, because a watery solution of malt extract begins to decompose after 1 hour. A solution changing the starch paste in 5 minutes will after 6 to 10 hours require 12 to 15 minutes. These are the principal reasons why I use smaller amounts of starch, and set down as standard the time required for transformation.

In order to prove the action of the diastase in the stomach, as indicated above under No. 2, recourse may be had to the dialisator, with which the following experiment was made.

One part malt extract was mixed with 100 parts by weight of starch which had previously been boiled to a paste with 2,500 parts of water. One-half of this mixture was placed in a dialisator, the other half in a closed bottle. Both portions were placed in water, and exposed to a temperature of 150°F. for 24 hours, the water into

which the dialisator was placed renewing itself constantly. After 24 hours the solution in the dialisator still had a fresh odor, showed little acid, and scarcely gave with a solution of iodine a red color, while the solution in the bottle had assumed a very unpleasant smell, tasted very sour, and still contained a large amount of undecomposed starch, which, on an addition of 2 parts, by weight, of extract, did not dissolve.

Two extracts of equal amounts of diastase may contain unequal amounts of acids, and then act differently on starch, as has been proven by the tables given in my previous paper. For this reason the amount of acid should always be determined before examining the diastatic effect, and should, in a carefully prepared extract, and calculated as lactic acid, never exceed 1·085 per cent. for every 100 parts of dry substance.

If the amount of acid is larger, the acid should first be neutralized, and following this the effect of the diastase should be examined.

A neutralized malt extract will certainly not act as rapidly on starch as an acid extract will. For instance, a malt which is not neutralized will act on an equal weight of starch in 2 and 5 minutes, respectively, at 100°F.; after the acid is neutralized it will dissolve the same amount of starch in the same time, but at a temperature of 150°F.

Considering that commercial starch is not always of the same quality, more precise examinations require for use a filtered solution of starch paste, in which the amount of starch has been determined. After unfiltered starch has been wholly transformed into gum and dextrin, its membranes are attacked and require a long time for dissolving. Therefore it often occurs that after iodine shows no coloring a violet color may again be produced after the lapse of a few minutes. These reactions will pass off smoothly by using the filtered starch solution.

For neutralizing the acid I mix well-washed and still moist carbonate of magnesium with a 10 per cent. solution of malt extract, shake until the acid reaction has disappeared, filter, and add the requisite quantity of starch paste. This method should always be resorted to as a check experiment for the determination of diastase. For ascertaining the effect of diastase on large quantities of starch we should always use the dialisator.

Remarks on the Testing with Iodine.—Respecting the addition of the solution of iodine to the water, with which the reaction upon starch is

to be accomplished, it should be continued merely until the color of the liquid appears faintly yellow. In this manner, only, can the changes of color be distinctly watched. Before adding the fluid to be tested, 5 drops of a 10 per cent. sulphuric acid should be added for every 2 oz. of water, in order to arrest the further effects of the diastase, and to combine with the bases or organic decomposition products possibly present. In this manner the experiment may be made with any kind of water.

Should the changes of color still be indistinct, which, with a malt extract poor in diastase, is always the case, the tested liquid should be warmed till it appears colorless. On cooling the blue color appears first, followed by the red, and lastly the brown color, the latter, when much albumen was contained in the malt extract.

Using a large quantity of starch for these examinations, the warming of the tested liquid is absolutely necessary, as the large amount of dextrin produced will hide the color reactions. If we wish to omit the iodine reaction, determinations of the sugar, dextrin and gum must be made, which will be described further on. In this place it may be sufficient to say, that 100 parts of starch are equal to 105.8 maltose or 111·6 grape sugar.

Extracts of different diastatic value requiring for the transformation of an equal weight of starch 2 minutes at 100°F., require for 5 parts of starch 7 minutes at 150°F.; 4 minutes at 100°F., require for 5 parts of starch 10 minutes at 150°F.; 5 minutes at 100°F., require for 5 parts of starch 18 minutes at 150°F.; 7 minutes at 100°F., require for 5 parts of starch 27 minutes at 150°F.

One part of the same malt extract requires the following time for dissolving different amounts of starch at 100°F. and 150°F:

1	part	starch	2	minutes	at 100°F.;	½	minute	at 150°F.
2	parts	"	5	"	"	3½	minutes	"
5	"	"	45	"	"	18	"	"
10	"	"	95	"	"	60	"	"
50	"	"	12	hours	"	120	"	"
			(still violet.)			(still violet.)		

One part of another extract neutralized required at 150°F., for 1 part of starch 4 minutes; for 2 parts of starch 10 minutes; for 5 parts of starch 60 minutes.

Ash Determination.—To determine the several constituents it is best to use a solution containing 10 grams of malt extract in every 100cc.

This solution should never be allowed to stand longer than 6 or 8 hours, and during this time should be kept at a cool place. Further, every time the solution is measured or weighed it should be well shaken.

On the incineration of malt extract, a charcoal very difficult to consume, is produced, and it is therefore best to incinerate only small quantities; for example, 5cc. of the 10 per cent. solution. Complete combustion may be attained by frequently cooling the crucible, dampening the charcoal with alcohol or spirit of nitrous ether and allowing the temperature never to exceed a dark red heat. If a combustion-furnace is at hand, the incineration with oxygen is to be preferred to any other method.

The determining of the several constituents of the ash may be omitted here; but I would remark, that the amount of phosphoric acid is one-third, and that of potassa is 30 to 32 per cent. of the whole ash.

Estimation of the Solids and of the Water.—If, instead of using the tables published in my former article, gravimetric determinations are to be made, I would like to call attention to the following:

Evaporation of the extract by the usual method is not easily accomplished, as notwithstanding all care, the extract will be partly burnt near the edge of the crucible, while the main bulk is yet damp. To avoid this change it is necessary to mix the extract with dry, clean sand and expose it in a glass tube placed in the drying-oven to a current of dry air or carbonic acid gas. In this manner exact results are quickly attained. Should the extract of commerce contain glycerin, it is necessary to call attention to the fact that glycerin may lose 12 per cent. of its weight on heating at 110°C. for 6 hours.

Estimation of the Nitrogenous Substances.—In estimating these substances, combustion with soda-lime should always be resorted to. Or the total albumen, etc., may be precipitated with tannin solution. The precipitate is then washed, dried, weighed, and after a deduction of 8·75 per cent. for tannin, is counted as nitrogenous substance.

Another part of the solution of malt is boiled, and after cooling, the coagulated albumen is collected, washed, weighed, and deducted from the total albumen. In this manner we get the amount of, by heat, soluble and insoluble albuminous bodies. In both estimations the ash should also be determined and its amount deducted.

Attention should also be directed to the necessity of precipitating

with tannin, always in the cold, because, if the solutions are warm, the resulting precipitate cannot be filtered off.

The coagulable, and while boiling, non-coagulable nitrogenous substances are the most important estimations.

For the separation of all the nitrogenous bodies I recommend W. Klinkenberg's method, published in "Repert. d. Analyt. Chemie," II, 376, and "Fresenius Zeitschrift," vol. 22, page 621. I have made a number of assays according to this method and received good results.

A malt which is rich in diatase contains in 100 parts of nitrogenous substances:

peptone	74·79	
albumin	47·14	
protein	8·07	
or, coagulable substance		37·70
non-coagulable substance		62·30

With respect to the peptone, the greatest variation occurs, and depends on the greater or smaller diastatic action, and it seems also to be much influenced by the temperature and time used in the preparing of the malt extract.

Determination of the Gum.—It should be remarked at the outset, that a malt extract, rich in diastase, never contains a trace of dextrin, but a gum which is left rotating, and therefore does not deserve the name dextrin; it is precipitated by acetate and by basic acetate of lead, as well as by alcohol, does not reduce copper solution in the cold, but on heating, reduces it only very slowly; with a mixture of calcium chloride and ammonia a precipitate is produced. It is easily transformed into right rotating sugar, by hydrochloric or sulphuric acid, and a portion of it is also, in a dilute solution, by diastase, converted into dextro-sugar, which shows the presence of two gums.

If malt extract be allowed to act on a large amount of starch, as in the production of maltose, then little gum and a large quantity of dextrin is produced. Having made a full examination of this gum, I shall report my results in a subsequent paper.

For the determination of this gum, the albuminous bodies are precipitated with a 10 per cent. tannin solution; the filtrate is then mixed with an equal volume, or a sufficient quantity of a 30 per cent. acetate of lead solution, and the precipitate is washed first with water, and later on with alcohol. If polarization is intended, the precipitate may be decomposed by sulphate of sodium, and the clear filtrate brought

directly into the apparatus. Using a tube of 200 millimeters, each degree to the left indicates 0·998 per cent. of gum. If the gum is to be determined in a different way, the lead precipitate should be decomposed, in the usual manner, by H_2S, the gum be transformed into grape-sugar by the use of acid, and the sugar be determined with copper solution. Or, the solution freed from lead, is again precipitated with basic acetate of lead, filtered, the residue dried, weighed and burned, and then the oxide of lead deducted.

Determination of the Maltose.—The filtrate from the precipitate with lead acetate may be directly polarized; for a tube of 200 millimeters each degree to the right indicates maltose equal to 0·364 per cent. of the solution. Or sufficient sulphuric acid is added to the filtrate, until the free acid amounts to 2 per cent., and heat is applied for six hours, when the maltose will be converted into glucose, the latter being determined by Fehling's solution, 10Ccm. of which indicate 0·07 Gm. of maltose.

From 248 analyses the mean composition of 2 to 4 minutes malt extract, calculated for 100 parts of dry substance, has been determined as follows:

Maltose	69·270
Gum	23·800
Soluble albumen	3 826
Insoluble albnmen	1·405
Lactic acid	1·085
Ash	1·614
	100·000

Sirop de Dentition (Delabarre).—Among my notes I find the following improvement, credited to Hager (?):

Glycerini	℥i
Chloroformi	gtts. x
Tinct. croci hispan. (1:8)	℥ss
Mellis	℥ss

M.

This formula is more likely to relieve the itching of the gums than the original. Spanish saffron, by the way, is credited with possessing anodyne (calming) properties.

The best way to exhibit the syrup would be to apply it to the gums by smearing, and slightly rubbing them.

HANS M. WILDER.

[Hager, in "Phar. Praxis," i, p. 957, gives the following formula: Tinct. croci 7·5, Tinct. ipecacuanhæ 1·0, Syr. rhei 50·0, Syr. liquiritiæ 50·0 gm. Some add a little vanilla. (See, also, "Am. Jour. Phar.," December, 1884, p. 614.)—EDITOR AM. JOUR. PHAR.]

A CHEMICAL EXAMINATION OF POLYGONUM HYDROPIPER.

By Henry Trimble and Herman J. Schuchard.

[A contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.]

From recent reports of the medicinal activity of this drug and from the absence of a complete analysis of it, we were induced to undertake an examination with a view, primarily, of determining the nature of the pungent principle. The drug was collected for us in the vicinity of Philadelphia, during the past summer, by a botanist thoroughly familiar with the requirements of the case, so there can be no doubt about the species of Polygonum employed in the following analysis.

About 50 grams of the tops and leaves, free from the larger stems, were powdered and the whole passed through a No. 80 sieve; of this 20 grams were taken, and the scheme recommended in Dragendorff's Plant Analysis followed as closely as the peculiarities of the case would admit.

Petroleum spirit, with a boiling point below 45°C., extracted 2·7 per cent. of a material which proved to be a wax, melting at 48°C., soluble in absolute alcohol, ether and chloroform, and saponifying with alcoholic potash. No volatile or fixed oils were found.

The drug, after extraction with petroleum spirit, was dried and exhausted with absolute ether, which extracted 1·54 per cent., a very small portion of which was soluble in water, the remainder was soluble in chloroform, benzol and absolute alcohol; a concentrated solution in the last solvent, when poured into water caused a turbidity due to resin; from these and some other tests, we were led to believe that the ether-soluble portion consisted of resin and chlorophyll.

The original drug after the ether treatment was dried and exhausted with absolute alcohol, by which we obtained 5·14 per cent. of solid matter. 2·27 per cent. of this was soluble in water; this aqueous solution contained tannin. When made alkaline and treated successively with petroleum spirit, benzol and chloroform, then acidified and similarly treated, no crystalline principle was obtained. The portion of the alcoholic extract insoluble in water proved to be an acid resin. The alcoholic solution contained the pungent principle, but on heating it disappeared.

The remainder of the original drug yielded to water 7·22 per cent.

of solid matter. No crystalline principle was found, but there was obtained ·55 per cent. of gum and 1·44 per cent. of sugar. That portion of the drug insoluble in water yielded 5·95 per cent. of solid matter to a ·2 per cent. solution of potassium hydrate, which was made up to 1 per cent. of albuminoids and some phlobaphene. That which remained from the treatment with dilute alkali gave to hydrochloric acid 6 per cent. of solid matter which consisted principally of the salts found in the ash. Only a very small amount of starch was found. On bleaching the final residue with chlorine water, drying and weighing, 57·45 per cent. of cellulose was obtained. Another portion of the original drug yielded 10·25 per cent. of moisture, and on incineration, 7·4 per cent. of ash of which 3 per cent. was soluble in water, consisting of potassium and sodium salts; the remainder proved to be iron, aluminium and calcium with phosphoric acid.

Two tannin determinations, by the gelatin and alum process, gave very close to 3·46 per cent. A tincture of the drug was made with diluted alcohol, which contained the pungent principle, but on concentrating by distillation that peculiar taste failed to show itself, either in the concentrated residue or in the distillate. The residue on treatment with petroleum spirit, benzol and chloroform, yielded nothing. From these experiments we concluded that the active principle is decomposed on the slightest heating, and that the only proper preparation of the drug would be one made without the application of heat.

In American Journal of Pharmacy for November, 1871, Dr. C. J. Rademaker claims to have isolated the active principle, which he named polygonic acid. We prepared some of this substance according to his method, by exhausting the drug with diluted alcohol, evaporating and adding basic acetate of lead, by which we obtained the yellow precipitate. This, on treatment with H_2S, yielded to the first portions of ether shaken with it a greenish, and to the successive portions a brownish residue. All these portions were acid to litmus paper and gave the reactions stated by the author. We also found this residue to give a precipitate with gelatin, and in many other ways to resemble tannic as well as gallic acid; the latter would account for the crystalline appearance of the residue. As such treatment of the drug would probably give tannic and gallic acids, we tried a mixture of the two by the same reagents as were applied to the so-called polygonic acid, and found a remarkable similarity. The conclusion naturally follows that polygonic acid is a mixture of impure tannic and gallic acids,

together with a small quantity of chlorophyll. The following summary shows the amount of the most important constituents:

	Per cent.	
Water	10·25	
Wax	2·70	From petroleum spirit solution.
Resin and chlorophyll	1·54	From ether solution.
Resin, tannin and chlorophyll	5·14	From alcoholic solution.
Sugar	1·44	From aqueous solution.
Gum	·55	
Tannin and extractive	5·23	
Albuminoids	1·00	From alkali solution.
Phlobaphene, etc	5·95	
Salts and a small amount of extractive	6·00	From dilute acid solution.
Cellulose	57·45	
	97·25	

Separately determined: tannin, 3·46 per cent.; ash, 7·40 per cent.

PHILADELPHIA, *December* 16, 1884.

Nutmegs are Poisonous.—Early in December, 1884, one afternoon, a lady here ate one and a half nutmegs. About two hours after, she became drowsy, and remained so nearly an hour, the drowsiness amounting almost to stupor. This was followed by an excited condition, with sharp pain in the brain, then involuntary laughter, wild fancies and incessant talking, without loss of consciousness. Presently pain was felt in the region of the heart, with cold extremities and a depressing sensation. Her face was very pale and her pulse weak and thready. These alarming symptoms lasted more than an hour, during which time two doses of ammonium bromide were administered. Next morning it was necessary to repeat the dose. Since then she has been unusually nervous.

I publish this case because it is not generally known that nutmeg is poisonous; and, being regarded as a valuable domestic remedy, it is well to remember that large doses of it are dangerous. This patient took about 135 grs., whereas from 5 to 20 grs. is the dose.

J. DABNEY PALMER, M. A., M. D.

MONTICELLO, FLA.

[The narcotic properties of large doses of nutmeg are mentioned in Natl. Dispensatory, p. 1007, and in U. S. Dispensatory, p. 969.—EDITOR.]

PRACTICAL NOTES FROM FOREIGN JOURNALS.

By Hans M. Wilder.

Cake White (Face Powder).—Oxide of zinc 4, rice starch 4, white French chalk 4, calcined plaster of Paris 1; rub well together, and mix with sufficient water to suitable consistence so that it can be poured out into boxes or paper moulds (if in moulds, cut to proper size and shape after 5 to 10 minutes).—*Pharm. Zeit. Russl.*, xxii, p. 6.

Oils of Cassia and Cinnamon may be distinguished by their specific gravity. The former has 1·0366, and the latter 1·0097.—*Rundschau*, viii, p. 768.

Carbon Diffuses through Porcelain.—Violle has observed that if a porcelain crucible, inserted into a black lead crucible, be heated to about 1,500°C. (melting-point of palladium), the latter will look as light colored as if made of clay, while the porcelain crucible is quite black.—*Ber. d. Deutsch. Ges.*, xv, p. 275.

Paper and leather may be rendered very pliable by soaking in a solution of 1 part of acetate of sodium or potassium in 4 to 10 parts of water, and drying.—*Polyt. Notizbl.*, xxxvii, p. 365.

Citric Acid Freed of Iron.—During the Turco-Russian war some 40,000 pounds of citric acid got contaminated with iron and zinc.

Meyke found that, by converting the acid, by means of chlorinated lime, into citrate of calcium, and decomposing the latter with sulphuric acid, he succeeded in obtaining a perfectly pure acid. To a cold filtered solution of 16 parts contaminated acid in 96 parts distilled water was added about 21 parts chlorinated lime, previously reduced to a thin paste. After quickly straining, the liquid was heated to boiling, separating completely the citrate of calcium, while the chloride of iron and zinc remained in solution. The magma was transferred to a strainer, and washed completely with boiling hot water till ammonium sulphhydrate ceased to indicate metals. To the citrate of calcium (about 20 parts) was added about 60 parts of diluted sulphuric acid (1:5), under constant stirring, and, lastly, heating to boiling.

After complete decomposition the solution of pure citric acid was filtered from sulphate of calcium, evaporated to syrupy consistence, let stand for some hours, decanted from the sediment, and evaporated further in water-bath. Crystallization was hastened by dropping a small crystal of citric acid into the cooled liquid. Meyke obtained from

52 pounds impure citric acid 40 pounds pure acid by means of 68¼ pounds chlorinated lime and 32½ pounds concentrated sulphuric acid. 35¾ pounds calcined gypsum were obtained as a by-product.

He found the following methods unsatisfactory: 1. Oft repeated recrystallization. 2. Carbonate of calcium. 3. Carbonate of barium. 4. Acetate of lead. 5. Wood and animal charcoal.—*Pharm. Zeit. Russl.*, xxii, p. 297.

Musk.—The German Consul-General in Shanghai states that the average annual exportation is about 3,000 catties (one catty contains 15 to 20 pods of Yunnan musk, or 20 to 25 pods of Tonquin musk); this requires 60,000 musk deer. He states further that even the best pods do not contain much more than 60 per cent. of true musk, and 30 per cent. will about represent the average.—*Schweiz. Woch.*, xxi, p. 157.

Bestucheff's Tincture of Iron.—100 parts of solution of chloride of iron, 400 parts of absolute alcohol, 150 parts of sulphuric ether.—*Rundschau*, ix, p. 301.

Carbolic Acid.—According to Meyke the red color is due to the presence of lead; he recommends to keep it in tin containers.—*Pharm. Zeit. Russl.*, xxii, p. 431.

Brandy Flavor.—4 parts of acetic ether, 50 parts of Jamaica rum, 100 parts of arac, 1,000 parts of alcohol and 1,200 parts of water; pour over 10 parts of pineapples and let stand.—*Rundschau*, viii, p. 503.

Meat Juice.—Sippel recommends the following as the easiest way to obtain nearly all the juice:

Cut one pound of best lean beef in slices about one-third of an inch thick, and lay the slices one alongside of the other on a strip of muslin, 6 inches wide and 1 yard long, sprinkling with fine salt. Now roll up the whole strip, tie a string several times around, and put in an ordinary press. After half an hour, about half a pint of red, transparent juice will be obtained.—*Pharm. Zeit. Russl.*, xxii, p. 600.

Varnish for Sheet-iron and Tin Ware.—30 parts of crystallized acetate of copper (verdigris) is rubbed to a fine powder, and, spread in a thin layer, left exposed in a moderately warm place for several days. The light-brown powder is ground with a little oil of turpentine and mixed with 100 parts of fat copal varnish, previously heated to 120°F. Let stand several days in a warm place, shaking it once in a while; finally, let deposit. If applied in three or four coats, a

dark-green color is produced; if only one or two coats, and afterwards heating in a drying oven, different colors are obtained, according to the longer or shorter exposure to heat (light or dark gold, orange, brownish red).—*Polyt. Notizbl.*, xxxviii, p. 172.

Precipitation.—The best way to precipitate is not to pour one solution into the other, but to pour both simultaneously, in a thin stream, into a large quantity of water.

The precipitates obtained in this way are not only in an exceedingly fine state, but also easy to wash out and dissolve.

If the two solutions differ much in specific gravity, the best way is to let the heavier run in near the top of the water, and the lighter near the bottom. If possible, both solutions ought to be brought to the same bulk.—*Dieterich, Pharm. Zeit. Russl.*, xxiii, p. 371.

Honey.—Dieterich finds that honey kept in woods very soon ferments, while honey from the same batch kept well in glass or earthenware.—*Pharm. Zeit. Russl.*, xxiii, p. 385.

Fixed Oils, Fats and Ointments.—Dieterich strongly recommends benzoinating them; he employs at least 10 per cent. benzoin, although for fats 20 per cent. is better. Only recently rendered fat can be preserved successfully in this way (and all ointments made with it); old and partially rancid fats are not preserved.—*Ibid.*, xxiii, p. 386.

Bicarbonate of Sodium.—Dieterich recommends keeping the bicarbonate in a cool place and in tightly stoppered containers, since it is apt to lose part of its carbonic acid, and thus be converted into monocarbonate if exposed to the air.—*Ibid.*, p. 387.

Saponimentum.—This is a name proposed by Dieterich for opodeldoc, and he gives several formulas. Saponimentum with arnica; Peru balsam; carbolic acid; eucalyptus; iodine; iodine and sulphur; iodoform; tar; sulphur; storax; thymol.

They consist of stearin soap, olein soap, alcohol and the respective medicinal component.—*Ibid.*, p. 389.

Silver-plating Solution.—Ebermeyer dissolves 20 parts of silver in 60 parts of nitric acid, adds 20 parts of caustic potassa, 50 parts of distilled water, filters, and adds sufficient distilled water to 22° B. (sp. gr. 1·176). The objects are cleaned with alkali, etc., dried, warmed, and moved backward and forward in the solution; they are then dried with saw-dust, and finished with precipitated chalk and chamois.—*Pharm. Zeit. Russl.*, xxiii, p. 405.

Cement for Brass on Glass (for instance, petroleum lamps).—1 part

of caustic soda, 3 parts of rosin and 5 parts of water are boiled together till solution is effected, which is intimately mixed with one-half of its weight of plaster of Paris. The mixture hardens within one hour, and is impermeable for coal oil.—*Puscher, Pharm. Zeit. Russl.*, xxiii, p. 423.

Moth Paper.—Soak paper with equal parts of carbolic acid and naphthalin.—*Dieterich, Ibid.*, p. 486.

Green Color for Ointments and Oils.—Sicha recommends an alcoholic extract of turmeric (one part representing ten parts of the root), which is rubbed smooth with a little alcohol, and mixed with the liquefied fat. When about half cooled down add sufficient of a solution of blue carmine (indigo carmine) till the desired shade has been obtained. —*Leitm. Rundschau*, ix, 2.

Creasote.—A more manageable form for toothache than the pure article is creasotated collodium (equal volumes creasote and collodium), which forms a kind of varnish over the carious tooth.—*Ibid.*, p. 6.

Pain Paint.—Against migraine, toothache, etc. 5 grams oil of peppermint, 10 grams chloroform, 6 grams acetic ether, 10 drops essential oil of mustard, 5 drops oil of valerian. Use a camel's hair brush.—*Ibid.*, p. 28.

Itch Remedy.—Wash the whole body, on going to bed, with a solution of hyposulphite of sodium (1:5), and the next morning with diluted muriatic acid (1:20). By this treatment the pores of the skin will contain finely divided sulphur.—*Leitmeritz*, x, p. 757.

Production of Sulphate of Quinine in Europe.—Fabricca lombarda, Milano, 200 kilos a day; Bœhringer & Sons, Mannheim, 150 kilos; Zimmer, Sachsenhausen, 100 kilos; Pelletier, Paris, 100 kilos, Howard, London, 50 kilos; Brunswick, 50 kilos; Jobst, Stuttgart, 20 kilos: Koch, Oppenheim, 20 kilos; Amsterdam, 10 kilos; Frankfurt on the Main, 10 to 20 kilos; Whiffen, London, 10 to 20 kilos; Tellandier, Paris, 10 kilos.—*Leitmeritz*, x, p. 456.

Purity of Copaiva Balsam demonstrated microscopically.—Place a drop of the balsam on a slide, and dust in a few grains of canna starch. If pure, the starch granules will be invisible; if the balsam, however, be adulterated, its altered refractive power will cause the starch to become visible.—*Ibid.*, x, p. 598.

German Oil of Rose.—The well-known essential oil firm, Schimmel & Co., in Leipzig, have undertaken to distil the oil from roses grown in Germany, and at their first venture obtained three kilos of oil. Its

odor is stronger than that of the Turkish oil (chiefly, perhaps, because it is pure), and its freezing point higher. Turkish oil freezes at 21°C., while the German freezes already at 32°C.—*Ibid.*, x, p. 676.

SUBSTANCES ACCOMPANYING BENZOIC ACID PREPARED FROM BENZOIN.

By O. Jacobsen.

On treating benzoic acid from gum benzoin with sodium carbonate solution, an oil is left undissolved, smelling of vanillin and also of phenol. By fractionation, it may be separated into three principal portions, boiling at 200–210°, 235–245°, and 280–330°, and a pitch-like residue not further examined. The first fraction consists of methyl benzoate and guaiacol, which can be separated by treatment with cold dilute caustic soda. The second and smaller fraction, when shaken with water, gives up catechol in the acqueous solution; the portion insoluble in water and dilute alkalis is acetylguaiacol. The third and largest portion consists of an oil, insoluble in dilute alkalis, which by saponification with alcoholic potash, and subsequent treatment with water and ether, yields benzyl alcohol, and benzophenone, whilst the aqueous solution contains guaiacol and benzoic acid; this fraction therefore contains benzyl benzoate, benzophenone, and benzoylguaiacol. The oil also contains vanillin, but in minute quantity only. The medicinal value of sublimed benzoic acid is attributed to the catechol and guaiacol; it is believed that of the above bodies only vanillin and benzyl benzoate exist ready formed in the gum. Benzaldehyde may be formed by the oxidation of the contained benzyl benzoate, so that the production of the former cannot be considered as a proof of adulteration with cinnamic acid. Schlickum and Schneider have tested the genuine nature of natural benzoic acid by its reducing boiling ammoniacal silver solution; but catechol will reduce the solution in the cold, and the author therefore suggests the following method of testing:—Convert the benzoic acid into the sodium salt, and, after drying, shake with ether; after removal of the ether, the residue may be dissolved in water, and the above or any other tests for catechol applied.—*Arch. Pharm.* [3], xxii, pp. 366–374; *Jour. Chem. Soc.*, Nov. 1884, p. 1168.

QUASSIN AND ITS CONSTITUTION.

By V. Oliveri and A. Denaro.

In order to prepare quassin from quassia, 10 kilos. of the finely divided wood are twice extracted with 45 litres of boiling water, and the solution evaporated to 10 litres *at a gentle heat;* when cold, the quassin is precipitated by tannin, collected, washed, and after being mixed with a sufficient quantity of lead carbonate, it is thoroughly dried at 100°. The product is then extracted with boiling alcohol, the alcohol distilled off, and the residue set aside until it deposits the quassin in a crystalline state; it is, however, always contaminated with resinous matters, from which it is purified by repeated crystallisations from dilute alcohol: 30 kilos. of the wood gave 10 grams of pure quassin. It crystallises in very slender, colourless, iridescent needles, which belong to the monoclinic system, the predominating form being the oblique prism with rhombic base. It melts at 210–211° (Christensen 205°), and is very soluble in alcohol, chloroform, and acetic acid, but only sparingly in ether: 100 parts of water at 22° dissolve 0·2529; the aqueous solution becomes yellow on exposure to the air, is dextrorotatory, excessively bitter, and reduces Fehling's solution. The results of the analyses agree nearly with the numbers required by the formula $C_{32}H_{44}O_{10}$, and differ considerably from those given by Wiggers and by Christensen, who proposed the formulæ $C_{10}H_{12}O_5$ and $C_{31}H_{42}O_9$ respectively.

When quassin is heated at 90° for some hours with dilute sulphuric acid (4 per cent.), it yields *quasside* $C_{32}H_{42}O_9$, a white, amorphous, bitter substance, formed from quassin by the removal of the elements of 1 mol. H_2O; no glucose could be detected in the mother liquors. It melts at 192–194°, and when boiled with dilute alcohol is reconverted into quassin, which crystallises out as the solution cools Quasside is also formed when quassin is boiled with acetic anhydride, but if sodium acetate is present there is a powerful reaction, and several substances seem to be produced; these have not as yet been submitted to examination.

Bromine diluted with acetic acid acts on a solution of quassin in the same solvent, and on adding water an amorphous resinous substance is obtained, but it does not crystallise; this melts with decomposition at 155°, and the results of the analyses suggest the formula $C_{32}H_{41}Br_3O_9$. Nitric acid added to an acetic solution of quassin seems

to give rise to a nitro derivative, which is precipitated on the addition of water. It dissolves in boiling alcohol, and, as the solution cools, is deposited again as a yellowish powder which melts at 130°.

If quassin is heated with concentrated hydrochloric acid in sealed tubes for four hours at 100°, methyl chloride is formed and escapes on opening the tubes; whilst the hydrochloric solution when diluted with water, deposits first a resinous matter, which should be removed and then, after a time, a colorless substance in small nodules. This new compound, which the author calls *quassic acid*, $C_{14}H_{19}O_3.COOH$, or $C_{28}H_{38}O_6(COOH)_2$, is far less soluble in alcohol than quassin, and crystallises in silky needles which melt at 245°, and reduce Fehling's solution and ammoniacal silver nitrate in the cold. It seems to be formed thus: $C_{32}H_{44}O_{10}+2HCl=C_{28}H_{38}O_6(COOH)_2+2CH_3Cl$, so that quassin would be the ethereal salt of quassic acid. The author has also tried the action of nascent hydrogen, and of boiling dilute nitric acid on quassin, but the products are resinous. Fusion with potash and oxidation with chromic anhydride also gave unsatisfactory results.

The resinous matter obtained in the preparation of crystallised quassin, and in all probability produced from the latter, was submitted to distillation with zinc-dust. The brown oily product was treated with sodium and fractionally distilled; the portion passing over at 170–190° when again distilled gave an oil boiling at 173–178° of the formula $C_{11}H_{16}$, whilst crystals melting at 76–78° were obtained from the residue in the retort.—*Jour. Chem. Soc.*, 1884, p. 1192, *Gazetta* xiv., 1–9. See also *Amer. Jour. Phar.*, 1884, p. 98.

Use of Iodoform.—Unna recommends iodoform for the healing of soft chancres, and for obviating the occurrence of suppurating buboes. The sore is first dried with absorbent cotton, then a drop of solution of iodoform in ether is spread upon the sore, and when it has become dry, it is covered with a piece of iodoform plaster or muslin. To conceal the smell the whole is covered with cotton, perfumed with an alcoholic solution of coumarin or other aromatic spirit. For the preparation of *Pencils of Iodoform*, Unna recommends iodoform 10 Gm., acacia 3 Gm., tragacanth and glycerin each 1 Gm.; sufficient water being used to form a mass, which is made into 5 pencils.—*Monatschr. f. Dermatol.*, Aug., 1884.

COCAINE AND ITS SALTS.[1]

By E. Merck.

Cocaine, $C_{17}H_{24}NO_4$ (according to Lossen), is the alkaloid contained in coca leaves (*Erythroxylon Coca*, Lam.), which was first isolated by Niemann in 1860. In 1862, Lossen discovered in the same leaves a second principle, hygrin, which is of a volatile nature, and has been hitherto but little investigated, but it appears to have a weak and hardly characteristic action. The further component parts of the coca leaves appear to be ecgonin, coca-tannin, and a peculiar wax.

The cocaine crystals belong to the monocline system, melt at 98°C., are easily soluble in alcohol, even more easily soluble in ether, but only dissolve in 704 parts water. The salts of cocaine are, on the other hand, readily soluble in water. The salts prepared commercially are the hydrochlorate, salicylate, hydrobromate, tartrate and citrate.

The first reports as to the results of the internal use of coca leaves have been handed down from the sixteenth century (Dr. Mondedes, Seville, 1569). In 1749 the plant appears to have been first brought to Europe. It was described by Jussieu and was named *Erythroxylon Coca* by Lamarck.

Tschudi, Markham, Poppig, and others, who have traveled in South America, found that the natives were in the habit of chewing coca leaves as a remedy for, or preventive against, the effects of extraordinary physical exertions.

The Indians chewed the leaves in conjunction with the ashes of *Chenopodium Quinoa*, the alkali contained in which seems to have eliminated the tannin from the coca leaves, and to have left the alkaloid free.

Since the discovery of cocaine the belief has gained ground, and, as it appears, quite correctly, that this alkaloid is the really active principle of coca leaves. At first it was believed, apparently with good grounds, that it possessed a property analogous to that possessed by caffeine, theine, and theobromine, viz., the power of retarding or stopping the change of tissue, but hitherto no facts absolutely confirming this theory have been discovered. Administered in small doses cocaine has an exhilarating effect, but in larger doses it paralyses the nerve centres and other parts of the nervous system. It has a fatal

[1] Abstract from a paper communicated by the author.

effect on warm-blooded animals (which are, however, apparently less affected by it than are cold-blooded creatures), by causing a cessation of respiration; it would therefore appear that cocaine is a poison, though its toxic qualities appear to be very mild and its action not cumulative.

Schroff, who made the first experiments with cocaine in 1862, observed that doses of 0·05 gram administered internally to rabbits caused considerable variation of the pulse and in the breathing, as also temporary mydriasis; the same dose administered subcutaneously caused death in convulsions of an epileptic nature, mydriasis in a strong degree being also observable, which, however, disappeared at once after death. In the case of frogs a dose of 0·001 gram produced complete immovability (preceded by a prior appearance of excitement); a dose of 0·002 gram proved fatal to frogs.

According to Froumüller, who made experiments in 1863, with a view of testing the narcotic effects of cocaine, a dose of 0·03–0·33 gram, internally administered, seemed to have no important effect upon human beings; in some cases sleep resulted, pulse and breathing at first somewhat accelerated, but afterwards became slower than under normal conditions.

In a case of attempted suicide a dose of 1·5 gram seemed to have no seriously injurious effect; the fatal dose, therefore, for human beings would appear to be very considerable.

As far as experiments with the infusion of coca leaves have hitherto gone they would appear to show that the coca leaves contain from 0·02 to 0·2 per cent. of cocaine; 0·05 gram of cocaine hydrochlorate seems to be the suitable dose for human beings.

The effects of subcutaneous injection of a solution of cocaine, on human beings appear to be, first, a feeling of warmth, then insensibility to feeling in the neighborhood of the part in which the injection has taken place, and, finally, a reddening of the skin. After a lapse of thirty minutes matters appear to resume their normal condition.

Cocaine placed on the tongue seems in some cases to deaden the action of the nerves. Dr. Th. Aschenbrandt states that he has found cocaine to have an excellent effect upon the human frame exhausted by diarrhœa. During the last few months Professor E. V. Fleischl, of Vienna, has affirmed that cocaine in the form of a subcutaneous injection is undoubtedly a valuable adjunct in preventing and curing the

craving for morphia. This circumstance alone should be sufficient to ensure for cocaine a lasting position as a valuable article of medicine.

In cases where the treatment can be prolonged decreasing doses of morphia and increasing doses of cocaine, and in cases where rapid treatment has been decided upon doses of 0·1 gram of cocaine alone are subcutaneously injected as often as the craving for morphia becomes apparent. Dr. Frend, who, amongst other instances, completely cured a case of craving for morphia within ten days by means of doses of 0·1 gram of cocaine subcutaneously injected three times daily, is of opinion that morphia and cocaine act antagonistically to each other.

The treatment of dypsomania seems to be comparatively much more troublesome; the first attempts appear to have been made in America and to have resulted fairly favorably. Cocaine has also been recommended as an aphrodisiac, and Dr. Frend seems to have certainly observed sypmtoms of sexual excitement after its administration.

As already observed, cocaine brought into immediate contact with the mucous membrane seems to produce temporary insensibility to feeling, and trials have been made with it not only in cases of disease of the throat, windpipe, etc., but results have also been obtained in the direction of producing local anæsthesia for the purpose of operations on the mouth, throat, etc. Cocaine will also probably come into important and frequent use in cases of ophthalmia.

On September 15 of this year, at the meeting of ophthalmologists at Heidelberg, the experiments made by Dr. Koller, in Vienna, were fully discussed. This gentleman experimented on various occasions on the eyes of animals and also upon his own eyes, and found that immediately after the introduction, by dropping, of a 2 per cent. solution of cocaine hydrochlorate a burning sensation in the eye lasting for about half a minute resulted, which was followed by an indefinite sense of dryness, the opening between the lids of the eyes under treatment appeared to be wider, while the tendency to shrink back, which would otherwise manifest itself on the cornea being touched, for instance, a twitching back of the head or of the eyelids, or the tendency of the eye to draw back on being touched, seemed to disappear, so that in this condition it was possible to produce by pressure a dimple on the cornea, or even to lay hold of the conjunctiva bulbi with tweezers without producing any unpleasant sensation. This absence of feeling on the part of the eye continued for about ten minutes, but a certain lack of

its usual sensibility continued for several hours. Twenty to thirty minutes after the introduction of the solution of cocaine hydrochlorate the pupil became enlarged, returning after some hours (at longest apparently after twelve hours) to its normal condition.

A slight difficulty in accommodating the two eyes to each other, which could, however, be easily overcome by an effort, was the only abnormal symptom observed during this period; otherwise the functions of the eye remained intact.

Which of the cocaine salts is preferable for the purposes of eye surgery remains to be proved, and will probably be positively ascertained very shortly. It remains to observe that the experiments, the results of which have been detailed in the foregoing were without exception made with the cocaine hydrochlorate; but it seems beyond doubt that the effects of other cocaine salts agree with the observations made in the case of cocaine hydrochlorate.

Dr. von Hoffmann, of Baden-Baden, an ophthalmologist, recommends cocaine salicylate for ophthalmic purposes.

Cocaine citrate has been successfully used by dentists for the purpose of anæsthising the dental nerves. This salt can be readily formed by kneading into pills, which, after being wrapped in wadding and moistened, are placed in the hollow tooth, which can then be cleaned or extracted comparatively, or even totally, without pain.

Cocaine splits up with concentrated hydrochloric acid into ecgonine, benzoic acid and methyl alcohol. Experiments are now being made as to the physiological action of ecgonine.—*Phar. Jour. and Trans.*, November 29, 1884, p. 426.

Administration of Quinine by the Rectum.—Dr. R. Peck states that quinine may be easily administered to children in the form of suppositories, and that the drug is not only rapidly and promptly absorbed in this way, but that also far larger doses may be given than per os. He made use of from 16 to 24 grains of the muriate of quinine at a single dose, adding about 30 grains of butter of cacao and a small quantity of simple cerate as mass for the suppository.—*Deutsche Med. Wochenschrift*, 1884.

CRYSTALLISED COLCHICINE.

By A. Houdès.

Three kilos. of colchicum seeds were exhausted with 100 kilos. of alcohol of 96°, the liquid filtered, the alcohol distilled off, and the residue treated repeatedly with a 5 per cent. solution of tartaric acid, which dissolves out the colchicine, but leaves fatty and resinous matters undissolved. The filtered solution was then agitated with chloroform, the chloroform removed by evaporation, and the crude product purified by repeated crystallization from a mixture of equal parts of chloroform, alcohol, and benzene. The yield from the seeds is about 3 grams per kilo., whilst that from the bulbs is only 0·4 gram per kilo.

The colchicine thus obtained forms nodular groups of colorless prisms, slightly soluble in water, glycerol, and ether, but soluble in all proportions in alcohol, benzene, and chloroform. It has a very bitter taste, and an alkaline reaction, contains nitrogen, and burns without residue. It is hydrated, and melts at 93°, but after drying at 100°, the melting point rises to 163°. A solution of colchicine does not reduce an alkaline copper solution, but after prolonged boiling with dilute sulphuric acid, it reduces it immediately, and in this respect resembles solanine. Colchicine combines with certain organic acids, but is decomposed when brought in contact with strong acids.

Concentrated or dilute inorganic acids dissolve colchicine and form a citron-yellow solution; nitric acid produces a transient violet coloration. Solutions of colchicine are precipitated by potash and soda, but not by ammonia. Tannin produces a white precipitate soluble on heating; platinum tetrachloride, an orange-yellow precipitate; an aqueous solution of iodine, a kermes-red precipitate; mercuric potassium iodide, a yellow precipitate; iodine in potassium iodide, a maroon-yellow precipitate.

Colchicine exerts a physiological effect only in relatively large doses. Respiration and the functions of the heart are considerably modified, and the general effect is a state of collapse, with stupor, but without insensibility.—*Compt. rend.*, xcviii, pp. 1442–1444; *Jour. Chem. Soc.*, pp. 1055–1056, October, 1884.

PERSIAN OPIUM.[1]

By Consul-General Benjamin, of Teheran.

Some years ago the production of opium in Persia was larger than at present. The unusual proportion of morphia which Persian opium contains made it justly preferable to that produced elsewhere, and large quantities found their way to foreign markets, and especially to China.

Two causes have latterly tended to check the culture and export of Persian opium, although the trade in the article is still important. One of these causes alone might not have led to such a result, but the two coming about the same time have somewhat discouraged the production of Persian opium. These causes were, the increasing adulteration of the article and the fact that the attention given to its culture materially reduced the more important culture of wheat, which led the Government to regard the opium product with disfavor.

Persian opium is chiefly grown in the provinces of Kermanshâh and Ispahân. The latter city is the centre of the opium trade of Persia. The opium of Ispahân is the best; the highest grade has been found to contain 15 to 16 per cent. of morphia. It is fair to state, however, that of late the opiums of Kûm, Teherân and Yezd have been growing in favor, some specialists considering the quality raised at Kûm as surpassing every other grade of opium. As the highest quality of Smyrna opium does not contain a mean of over 13·57 per cent. of morphia, some analyses placing it even lower, while the Persian drug yields at its best 13 to 16 per cent. of morphia, hard, it certainly rivals that of Smyrna, and is beyond question far superior to that of Egypt and India.

The chief objection to the opium of Persia lies in the adulteration to which it is subjected, the chief ingredient in this deterioration being grape-must, and sometimes small stones concealed in the parcels. This difficulty could be remedied by any enterprising house which, through honest, capable agents, could purchase the entire product of Persia, or of any one of the opium producing districts, and give direct attention to the preparation and packing of the drug. A pure article could also be obtained by a firm ready to form a contract for a certain quantity of a given grade of the drug for a term of years, the continuance of

[1] From the *Independent Journal.*

the contract depending on the non-varying proportion of morphia in the exported article.

The average price of the opium of Persia, in its crude state, is now four dollars and seventy-seven cents per kilogram. To 72 kilograms of opium are added 6 kilograms of linseed oil. The mixture is then subjected to a manipulation which reduces the 77 to 66 kilograms. These 66 kilograms are divided into one hundred balls, forming a Persian package. A specified number of the balls of opium make a case. The cost of packing, freight, and other incidental expenses bring the average price of a case of Persian opium, such as is prepared for export, up to three hundred and sixty-six dollars and sixty-six cents. The excise duties vary at different centres of the trade, but 5 per cent. *ad valorem* is the uniform rate according to the treaty of Turkomontchai on all goods exported to Europe or America, and, I may add, on all goods imported from those countries into Persia.

It is stated that two thousand cases of opium, valued at 732,000 dollars, are now exported from Bushire to England, besides what finds its way to China and other quarters from the other districts of Persia. There is no doubt that if sufficient encouragement were offered, especially by the establishment of agencies at Ispahân or Teherân, or by making permanent contracts, the product could be easily increased and the purity of the exported article improved. Indeed the opium merchants of Ispahân have already made overtures for the American trade, and are prepared to make contracts for a term of years.

It is proper to state inquiries made of practising physicians at Teherân, including an American physician, elicit the highest opinions in favor of the opium of Persia as regards the character and quantity of morphia it produces when unadulterated.—*Phar. Jour. and Trans.*, November 29, 1884, p. 430.

Tooth Paste.—Dr. A. W. Harlan of Chicago, recommends the following: Take of Precip. chalk, powdered orris root, *aa* ℥ij, white castile soap, powdered borax, *aa* ℥ss, powdered myrrh, ʒii, honey and glycerin, q. s. to make a soft paste. Color rose pink. Perfume to suit. To be used before retiring and after breakfast, on a brush not dipped in water and not too stiff.—*Dental Cosmos*, September, 1884.

CULTIVATION OF CINCHONA IN BOLIVIA.[1]

By Minister Gibbs, of La Paz.

I have devoted some time and attention to acquire data and information relative to the next important article, cinchona bark, or quina, of which large quantities are exported yearly. Formerly it was gathered by the Indians, and in such a manner that large forests were destroyed, trees cut down, the bark taken in any way merely to make up large quantities; to-day the quina plantations, or, as they are called here, quinales, are cultivated and nourished with care and agricultural science, the principal planters being Germans, one, Mr. Otto Richter, possessing two million plants; the estate of Mr. John Kraft, a Hollander, lately deceased, two million.

The cultivation of quina in plantations, systematically, has been carried on for about seven years, hardly long enough to show all the advantages, as there is room for much study and improvement.

Mapire, about sixty leagues north of this place, or about five days' journey, has under cultivation about four million five hundred thousand plants; Longa, northeast of this city about twenty leagues, five hundred thousand plants; Yungas, east northeast twenty leagues, one million plants; Guanay, east of Mapire, five hundred thousand plants; total, six million five hundred thousand plants.

Where the principal quinales are it is a very rough and broken country, the Andes being seamed and cut into deep valleys in every direction. The trees are planted on the sides of the valleys or ridges in altitudes of about 3,000 to 4,000 feet above the sea. They will grow higher up, even to 8,000 feet, but are stunted, and will give little or nothing of what is called here the quina salt. The plants want a great deal of sun, heavy rains and fresh winds.

I have conversed with three of the principal superintendents of the large quina plantations, all Germans, and they say that the cultivation of quina is yet in its infancy, and there will be many improvements through time and experience.

A tree will give from fifteen to twenty pounds of seed. The seed is collected in November and December (the early summer months here), and planted very thickly in boxes or beds about twelve feet in length and three feet in breadth, and placed on a slight decline or fall

[1] From the *Independent Journal.*

and well irrigated. When the plants are about six inches in height and have a few leaves—from five to six (which is about five months)—they are transplanted; holes of some eight to ten inches deep are dug about six feet apart, in which they are planted. The plant is covered partly over with twigs and other light stuff, grass and leaves, to keep off the sun for about three months. When the plant is strong and healthy, the undergrowth of other plants is cleaned out and great care is taken. This attention continues for about two years, and then the plants that are left are considered sound. About 25 per cent. of all the plants decay or rot in this time. Afterwards the undergrowth is cleared out once a year, and when the tree is six years old it is productive, grows to about fourteen feet in height, and has a diameter of about six inches, up to six or seven feet. Where the bark is of the most productive kind, the trunk grows straight and slender, and has the form of an orange tree. When a tree is left standing for ten or twelve years, it is over a foot in diameter, the bark is thicker and heavier, but not so productive in quinia. The bark is ready to cut when the tree is about six years old. An incision is made around the trunk of the tree a few inches from the ground, another incision some twenty-four inches above around the tree, and then two incisions opposite, lengthwise. The bark is pulled off in two pieces. Two cuts, and sometimes three, are got off each tree, twenty-two to twenty-four inches in length, and seven to eight inches in width. When removed it curls up like the cinnamon bark. After the tree is stripped it is cut down, leaving a trunk about twelve inches above the ground, and from the base, where the bark has been left, there spring out some fifteen or twenty shoots or sprouts; these are left growing until they are a little higher than the stump, then they are thinned out, leaving two or three; they grow fast and in five years give good bark.

The trees produce on an average about four and a half pounds of bark, and are stripped, in the southern hemisphere, late in the spring, October to January. The bark is placed in paved yards, and is generally cured in four days, but if rain sets in, at times it takes nearly three weeks.

The principal enemy in the insect line is a large black ant, which is very destructive. There are various classes of the quina tree, calysaya, green and purple. The greater part of the quina passes through this city baled and sent to Tacne and Mollendo. Cinchona is the common name for all quina.

The market price is now forty cents per pound, Bolivian currency. It has sold as high as two hundred bolivianos per quintal. It formerly paid a tax of 6·40 bolivianos per quintal; now one half, 3·20 bolivianos, one half to the Government and one half municipal.

As the greater part of the quina forests were destroyed, and until very lately, the cultivation of quina has not been carried out in a proper manner, it is only now that it may be said to be a regular business. The highest exportation of late years has been twenty thousand quintals; but it has dwindled down for various causes, so that this year it will not be more than five thousand quintals, and at present prices leaves no profit, the expenses of getting it to the coast being heavy.—*Phar. Jour. and Trans.*

THE HARVESTING OF CINCHONA BARK.[1]

The old idea that for the collection of the bark it was necessary to sacrifice or fell the whole tree, when grown to maturity, had long made way for a better view. In English India, Broughton had begun, in 1866, to pollard the trees, in order to be able to lop the new shoots after four to five years (coppicing system) as is done in Europe with oak and ash coppice. But, besides the trees receiving a serious shock by this treatment, from which they do not so speedily recover, the bark thus obtained is not nearly so good as the stem bark.

It was, therefore, an ingenious idea of Mr. McIvor, in the Neilgherries, to cover the stems with moss, in order to improve the quality of the bark. He was led to this by observing that the best—the so-called crown-cinchona—always occurs covered with moss. He made experiments in this direction and the result was that, not only was the quality of the bark improved, but that in this way it was possible to strip the stem of a part of the bark and to heal the wound thus made by covering it with moss, in other words, to renew the bark by artificial means.

By experiments on a large scale the new discovery was crowned with the best success.

The "mossing system" is almost universally practised in Java since 1879, and numerous chemical analyses have shown that the proportion of quinine in the renewed bark increases, and is even trebled. The "coppicing system" is now only practised when a rapid production of

[1] From the *Indian Mercury*. Reprinted from the *Tropical Agriculturist*.

bark is required, or when the sort does not allow of the "mossing system;" the felling, or rather uprooting, of the tree, is still practised exceptionally, when it withers, or when the plantation requires thinning.

Lastly, by way of trial, another method has been followed for a short time, viz., scraping off the outer bark; but though this product offered a precious and valuable material for the quinine manufacturer, the "scraping system" has not been continued on account of culture and commercial considerations. If I do not mistake, the Ledgeriana (in chips) realized at the sales in Amsterdam, in 1879, the enormous price of 10·44 f. per ½ kilogram. The quinine proportion was 13 per cent.

The "coppicing system" in a modified form, by leaving one shoot on the stem, is now generally and successfully practised in Java with the *C. Ledgeriana.*

The harvest of cinchona bark deserves a moment's further attention, as so little is known about it. Do not expect a description like "Les Vendanges" in Provence or Languedoc, or a mill-feast in a sugar-works in East Java, or of the padi-cutting in Java described by Multatuli. The reaping of the cinchona bark is unattended by poetical accessories, and the work-people are all quiet. In those elevated regions, sparsely populated, and then only temporarily, no clamor whatever prevails. All nature bears an appearance of monotony and gloominess. In the gardens and woods the sun can hardly penetrate; the trees mostly dripping with rain, or from the clouds floating above, it breaks down in a dreadful thunderstorm. Then the laborers—among whom are not unfrequently mothers with infants at the breast—experience all the miseries of a mountain climate at an elevation of 7,000 feet. Shivering with cold, the women sit, sheltered as much as possible by a screen of plaited dried leaves, peeling the lopped branches, and cutting the wet bark to measure; the small slivers, or so-called refuse, is carefully collected in baskets.

The heavier work is performed by men; they lop the branches, or, if the "mossing system" be followed, they make incisions lengthwise in the stem, at intervals of 3 to 5 or more centimetres, according to the thickness of the tree, and then strip the stem from below upwards to where the branches begin, but in such a manner that strips of bark of equal breadth are left alternately on the stem, by which it assumes somewhat the appearance of a fluted column. The strips of bark are then cut into lengths of 50 centimetres, and the stem, which is partially

denuded lengthwise, is entirely enveloped, as is done in Europe to some trees that could not bear exposure to our winters. McIvor at Madras did this first with moss, and hence the name "mossing;" but as this material was soon exhausted in Java, recourse was had to alang-alang, indjoek or dried grass, which occurs in great abundance.

In the course of one year this envelope is removed, then the healing —granulation we should say—the renewing of the bark is begun, and now comes the turn of the strips left on the tree the preceding year to be stripped off. Then the stem is again bandaged.

The wet bark, after being cut to measure, is dried either in the sun, or artificially, by which the pieces roll up in their breadth and thus form the familiar pipes. The packing is generally in jute-bags. They weigh about 75 kilograms.

From chemical investigation it has been proved that drying in the sun or by artificial heat is the same for the bark, and has no influence on the proportion of quinine.—*Phar. Jour. and Trans.*, Nov. 22, 1884, p. 410.

GALLISIN, THE UNFERMENTABLE PART OF COMMERCIAL GLUCOSE.

By C. Schmitt and A. Cobenzl.

Neubauer and other authors have stated that in wine, which in its preparation has been subjected to Gall's treatment with glucose and fermented, a certain portion of the glucose remains in the wine as an unfermented substance which is neither glucose nor dextrin. Owing to the interest that has arisen as to the possible unwholesomeness of gallinated wines, the authors have been led to investigate the subject, and have succeeded in separating from fermented glucose (prepared from potato-starch) an intensely hygroscopic substance which they have named *gallisin*. A physiological investigation of this compound is in progress, but at present for purposes of priority, the purely chemical part of the research is published.

Preparation of Gallisin.—A solution of 5 kilos. of glucose was fermented at 18–20° for five or six days with yeast and filtered. The solution thus obtained was then evaporated to a thick syrup on the water-bath and shaken in a flask with a large excess of absolute alcohol; it became thicker, but did not mix with the alcohol. After a second treatment with absolute alcohol (by means of which water, sugar, organic acids, etc., are extracted) the syrup was found to be converted into a

crumbling yellow-gray mass, which by pounding in a mortar with a mixture of absolute alcohol and ether can be obtained as a gray powder. This powder may be purified by dissolving it in water, repeating the above treatment, and drying over sulphuric acid.

Gallisin when viewed under the microscope is found to be amorphous and without any characteristic structure. It is intensely hygroscopic, more so than calcium chloride, but yields no definite compound with water. It is insoluble in ether, chloroform, and benzene, very sparingly soluble in glacial acetic acid and in absolute alcohol, but slightly more so in methyl alcohol, and in this it differs from glucose which is readily soluble. It dissolves when boiled in a mixture of glacial acetic acid and absolute alcohol, but it is precipitated from this solution by ether. In concentrated aqueous solution, it has an acid reaction to litmus-paper; and undergoes no change, either by heat or when treated with lead acetate, mercuric nitrate or chloride, ferric chloride, tincture of iodine, or calcium or barium chloride. Barium hydroxide precipitates a small quantity of a white barium compound. With silver nitrate, it undergoes no change until it is heated or ammonia is added, when metallic silver is precipitated. It rapidly reduces potassium permanganate, especially in slightly alkaline solution, with separation of peroxide of manganese. Potassium dichromate in dilute acid solution is also rapidly reduced. Fehling's and Knapp's solutions are reduced by it (in this it differs from dextrin), and 0·05 g. glucose are equal to 0·109784 g. gallisin in reducing power. A concentrated solution of gallisin prevents the precipitation of iron salts by ammonia or caustic alkalis. With acetic anhydride, it gives an acetyl compound, and it is converted into glucose by treatment with dilute mineral acids on the water-bath. On treating an aqueous solution with fresh yeast it is not fermented, nor does it undergo lactic fermentation, but if a dilute aqueous solution is allowed to stand for a time it decomposes with formation of a mouldy fungus. At 100° it gives off water and carbonic anhydride. It has a slightly sweet taste at first, but in time becomes insipid. A solution of gallisin turns the plane of polarization to the right, and this power increases according to the dilution of the solution. A very pure white specimen, when analysed with every care to prevent access of moisture, was found to contain 43·50 per cent. C and 7·36 per cent. H, and these results lead to the formula $C_{12}H_{24}O_{10}$ (C, 43·9 : H, 7·32).

Gallisin-barium, $C_{12}H_{22}BaO_{10} + 3H_2O$, may be obtained by precipi-

tating a concentrated aqueous solution of gallisin by barium hydroxide in alcoholic solution, and is purified by dissolving the precipitate in water, reprecipitating with alcohol, and washing with ether. The pure substance readily absorbs carbonic anhydride, is slightly alkaline, and reduces Fehling's and Knapp's solutions. It loses its water of combination over sulphuric acid.

Hexacetylgallisin is formed by heating gallisin with acetic anhydride for two and a half hours at 130–140° under pressure. The resulting brown mass is soluble in alcohol, and after driving off the excess of acetic anhydride on the water-bath, may be purified by boiling with charcoal; the acetyl-derivative is obtained on evaporation of its alcoholic solution as a colorless glass-like mass of the formula $C_{12}H_{18}O_{10}\overline{Ac}_6$. It is insoluble in water, but soluble in alcohol and similar solvents. If gallisin be heated for several hours at 170–180° with an excess of acetic anhydride, it is decomposed with formation, amongst other products, of ethyl acetate.

Gallisin-potassium, $C_{12}H_{23}KO_{10}$, is precipitated from an alcoholic solution of hexacetylgallisin by boiling it with alcoholic potash, ethyl acetate being formed simultaneously. It is a hygroscopic powder soluble in water, with alkaline reaction. In a similar way a precipitate of gallisin-lead may be obtained, $C_{12}H_{22}PbO_{10}+PbO$.

Conversion of Gallisin into Grape-sugar.—Equal parts by weight of gallisin and oxalic acid were heated on the oil-bath at 103° for two to three hours. On separating the oxalic acid with lime and evaporating the solution, a thick sweet syrup was obtained which in a few days formed a crystalline mass of glucose. The whole of the gallisin, however, could not be converted into glucose; by the prolonged action of oxalic acid on an aqueous solution of gallisin, it becomes yellow, and smells strongly of caramel.

Oxidation of Gallisin.—On pouring a solution of 100 grams gallisin in 50 cc. water into 400 grams strong nitric acid, a powerful reaction takes place, and the solution becomes heated to boiling, with evolution of nitrous fumes. On cooling, neutralizing with potash, and afterwards strongly acidifying with acetic acid, an acid potassium salt crystallizes out in beautiful groups of white needles soluble in hot water but sparingly in cold. About 20 grams of these were obtained and the results of analysis agreed with the formula $C_6H_9KO_8$. From this acid salt a neutral silver salt, $C_6H_8Ag_2O_8$, was prepared, and from the lead salt by the action of sulphuretted hydrogen the free acid was obtained

as a thick, acid, uncrystallizable syrup, soluble in water and alcohol but insoluble in ether. On distilling the ammonium salt, besides ammonia, pyrroline, etc., a sublimate was obtained which is soluble in water, alcohol, and ether, and at present is under investigation.

Action of Heat on Gallisin.—On heating gallisin in a current of hydrogen gas on the water-bath at 65°, carbonic anhydride and water are given off, and at 100° it melts to a thick amber-colored syrup; 17·2 per cent. of water (4 mols. = 18 per cent.) and 13·7 per cent. of carbonic anhydride (1 mol. = 13·4 per cent.) were given off. This syrup has many of the properties of gallisin, as has also its barium compound, which is found on analysis of the barium derivative to have the formula $(C_{11}H_{23}O_8)_2Ba$. This may mean that gallisin, when heated, gives up water and carbonic anhydride, but when the resulting substance is treated with water the water is again taken up, and, as the barium derivative shows, a compound is formed containing 1 mol. of carbonic anhydride less than gallisin.

The authors succeeded also in preparing pure gallisin from a wine which had been prepared by Gall's process in 1873, and identified it by the above reactions and by analysis. In conclusion, the authors mention that a physiological investigation of gallisin is being made, and already it has been found by numerous trials that there is no direct or indirect unwholesomeness in the use of gallisin or of the glucose which is formed along with it.—*Ber.*, xvii., pp. 1000–1015; *Jour. Chem. Soc.*, pp. 981, 982 and 983, October, 1884.

COLLOIDAL DERIVATIVES OF FERRIC HYDROXIDE.

By E. Grimaux.

When potassium hydroxide is added to a mixture of glycerol and ferric chloride, a precipitate is formed soluble in excess, and the solution has the characteristic properties of the colloidal solutions previously described (coagulation, etc.). The tendency to coagulate is diminished by the presence of a large amount of glycerol, and increased by the presence of sodium chloride or of potash in excess. If the proportion of glycerol is very large, coagulation is entirely prevented. When solutions rich in glycerol are dialysed, they first lose their excess of potash, then their excess of glycerol, and become coagulable by heat, and finally they form a firm thick jelly containing glycerol, ferric

hydroxide, and potash. Similar solutions are obtained by substituting either ammonia or soda, or sodium or potassium carbonate for potash. They seem to be compounds of glycerol, ferric hydroxide, and alkalis, and are easily dissociated by water into glycerol and insoluble compounds richer in ferric hydroxide. With acetic acid, they yield a precipitate soluble in excess, and this solution gives a greenish precipitate with potassium ferrocyanide, converted into Prussian blue by the action of a mineral acid.

Mannitol, erythrol, and sugar yield solutions having precisely similar properties.

Ferropotassium tartrate also forms colloidal solutions with similar properties, but they are not precipitated by potash in the cold, and the precipitate with carbonic anhydride is ochreous, and resembles ferric hydroxide. Potassium ferrocyanide produces a violet coloration, and Prussian blue is precipitated from this solution on adding an acid.

When a solution of ferric chloride is added to a solution of sodium arsenate, a precipitate of ferric arsenate is formed, but redissolves in excess of ferric chloride, forming a colloidal solution, which yields an opaque yellowish-white coagulum of the composition $Fe_2(AsO_4)_2$. In preparing this solution, excess of ferric chloride must be avoided, since this substance prevents coagulation by heat. If the solution is dialysed, it loses sodium chloride, and the jelly which forms is perfectly transparent and of a pale yellow color, but by prolonged dialysis it becomes reddish-yellow.

Potassium arsenite and ferric chloride yield a similar solution, which is very unstable, and coagulates spontaneously. With potash, it forms a precipitate soluble in excess, and when this solution is dialysed it yields a colloidal solution of ferropotassium arsenite, which does not gelatinise on heating unless mixed with potash solution, when a thick brown jelly resembling ferropotassium tartrate is formed. Arsenious acid therefore resembles tartaric acid in its behavior with ferric salts.

Boric acid and sodium phosphate behave like arsenic acid, but in the case of the phosphate the solution shows less tendency to coagulate.

A 2·26 per cent. solution of silica, obtained by the decomposition of methyl silicate, forms with ferric chloride and excess of potash a limpid solution, which becomes turbid after a few minutes.—*Compt. rend.*, xcviii., pp. 1485–1488 and 1540–1542; *Jour. Chem. Soc.*, p. 966, October, 1884.

THE PRESENCE OF OXIDES OF MERCURY IN BLUE PILL AND IN OTHER MERCURIAL PREPARATIONS.[1]

By Harold Senier, F.I.C., F.C.S.

My attention has just been called to a paper by Messrs. Dechan and Maben on "The Strength and Condition of Commercial Specimens of Hydrargyrum cum Cretâ, Pilula Hydrargyri and Unguentum Hydrargyri,"[2] read at the Hastings meeting of the British Pharmaceutical Conference. This paper is an attempt to further elucidate the question of the existence or non-existence of oxides of mercury in these preparations, and gives the results of the examination of some commercial samples of each of them, including an estimation of the metallic mercury and the two oxides. The results obtained by Messrs. Dechan and Maben may be summarized as follows: In hydrargyrum cum cretâ they find a considerable proportion of oxides of mercury, in one sample as much as 6·15 per cent. of mercurous oxide and 2·8 per cent. of mercuric oxide. In pilula hydrargyri, out of eight samples examined, in six they failed to find any trace of oxides, although one mass was four years old. In unguentum hydrargyri, out of twelve samples examined, in two only was oxide found, and in these only a very small percentage. These results are so materially opposed to those obtained by myself in an investigation of the same subject as to indicate an error on the part of one of us, either in method or experiment. This is particularly the case in regard to pilula hydrargyri, the results of my examination of which I recorded in a communication to the Pharmaceutical Society in February, 1876.[3]

The method adopted by Messrs. Dechan and Maben for the estimation of the oxides of mercury is to digest the substance under examination in hot or boiling acetic acid, and after washing the residue with the same menstruum to treat the acid solution, supposed to contain the two oxides as acetates, first with hydrochloric acid to precipitate mercurous chloride, and then with sulphuretted hydrogen to precipitate

[1] Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, Wednesday, November 5, 1884.

[2] "Phar. Jour.," Series iii, No. 743, p. 230; "Am. Jour. Phar.," 1884, p. 554.

[3] "Phar. Jour.," Series iii, No. 293, p. 621; "Am. Jour. Phar.," 1876, p. 143.

mercuric sulphide. From the weight of these salts, after drying, is calculated the amount of oxides present in the sample.

The method which I have used for the estimation of the oxides in the pharmacopœial preparations of mercury is first to digest the sample in hydrochloric acid to dissolve the mercuric oxide; to this solution, after neutralizing excess of acid with ammonia, stannous chloride is added and the reduced metallic mercury separated, dried over sulphuric acid and weighed; from this weight is calculated the amount of mercuric oxide present. To estimate the mercurous oxide a fresh portion of the sample is digested in a 5 per cent. solution of hydrocyanic acid, which converts the mercury of the mercuric oxide into mercuric cyanide and also so converts half the mercury of the mercurous oxide, leaving the remainder as metallic mercury. The hydrocyanic acid solution is treated with stannous chloride, in the same manner as the hydrochloric acid solution, and from the weight of metallic mercury obtained the weight of mercury existing as mercuric oxide is subtracted, and the remainder doubled, this result calculated into mercurous oxide gives the quantity present in the sample. This method for the estimation of mercurous oxide is based on some observations of Scheele on the action of hydrocyanic acid on oxides of mercury, and is more fully described in my paper on "The Composition of Pilula Hydrargyri" ("Pharm. Journ.," February 5, 1876). In that paper I gave the results of the examination of nine commercial samples of pilula hydrargyri, the oxides in which were estimated by the method I have just described. In each case, with one exception, the age of the sample was determined as accurately as possible. The age of the samples varied from eighteen hours to two years, and the percentage of oxides from a trace to 1·80 of mercuric oxide, and from ·25 to 4·22 of mercurous oxide. The proportion of oxides present bore such a striking relation to the age of the samples as to lead me to the conclusion that the proportion of oxides increases with the age of the sample, and that machine-made masses oxidize more rapidly than those made by hand.

After trying Messrs. Dechan and Maben's method on some commercial samples of pilula hydrargyri, and failing to find but a trace of oxides in them, while by the method which I had formerly used I found distinct quantities, I decided to try the two methods on a sample containing a known quantity of one of the oxides. As mercurous oxide exists in mercurial preparations to a much greater extent than mercuric I considered it the most suitable for the purpose, and after preparing a

fresh sample of pilula hydrargyri I added to it 5 per cent. of freshly precipitated mercurous oxide, and submitted portions of this mass to a careful analysis by the method employed by Messrs. Dechan and Maben, and by the hydrocyanic acid method I have described. The results were:

Hydrocyanic acid method.....4·72 p.c. Hg_2O.
Messrs. Dechan and Maben's method..... ·250 " "

Although there is no doubt more than one source of error in the process of Messrs. Dechan and Maben which contributes to this result, there can be little doubt that the most important one is the instability of mercurous acetate in presence of organic matter, especially glucose, it being rapidly reduced even at ordinary temperatures to oxide, a change which would be still more readily brought about by hot digestion. In support of this explanation of the opposite results obtained by Messrs. Dechan and Maben and myself is the fact that in hydrargyrum cum cretâ, a preparation free from organic matter and which, in my experience, is less liable to oxidation than pilula hydrargyri or unguentum hydrargyri, their process gives results coinciding very closely with my own and those of other workers on the same subject.

When I completed my examination of blue pill in 1876 I preserved samples of each mass analysed, and thinking the present opportunity a fitting one, I have again estimated the quantity of oxides in one of these samples which eight years ago contained ·24 per cent. of mercuric oxide and ·62 per cent. of mercurous oxide, but which I now find to contain 1·20 per cent. of mercuric oxide and 3·62 per cent. of mercurous oxide, thus affording another proof of the theory that the oxides of mercury, which undoubtedly exist in all samples of pilula hydrargyri, increase with the age of the sample.—*Phar. Jour. and Trans.*, November 8, 1884, p. 363.

In the discussion upon the foregoing paper Mr. Umney stated that a sample of blue pill made about six months had contained about 2 per cent. of mercurous and 1·2 per cent. of mercuric oxide. Blue pill made by machinery is slightly contaminated with iron, and this reacting with the astringent principle of rose leaves may cause a change of color. Blue pill is generally made by triturating metallic mercury with confection of roses in the bed of a large mill, the stones being of granite and a sweeper frequently made of iron following the stones in their circuit. Mr. Umney prepares gray powder in a similar manner by triturating well dried prepared chalk with mercury under granite stones, the process for 100 pounds occupying seven or eight hours.

Professor Redwood referred to his investigations made in 1860, when in examining a gray powder, which from its effects was supposed to contain arsenic or antimony, numerous samples were found to be free from these impurities, but to contain variable amounts of the oxides of mercury. In his analysis then made he discarded acetic acid and treated mercurial preparations first with hydrochloric acid and subsequently with hydrocyanic acid. He had frequently observed mercury with chalk to be contaminated with the two oxides of mercury, but not blue pill, except to a small extent. Mercury and chalk prepared by simple trituration in a mortar is, and has long been held to be, a valuable and perfectly safe preparation. But on putting the ingredients with several large pebbles into a cask, which is fastened up and turned by a steam-engine, the mercury is subjected to conditions in which oxidation takes place to a great extent; working under stone runners it would not be subject to the same oxidizing action. In blue pill oxidation may take place whilst the mechanical trituration is being effected; but that portion of the mercury which is in the metallic state incorporated with the conserve of roses, cannot undergo a continuous process of oxidation.

Mr. Schacht urged upon pharmacists to make hydrargyrum cum cretâ themselves, its oxidation being doubtless entirely a question of age. Mr. Gerrard coincided with this recommendation and extended it to other mercurial preparations which should be made at periods of about three or six months, so as to insure having them in a fresh condition, free from the injurious oxides.

MINUTES OF THE COLLEGE.

PHILADELPHIA, December 29, 1884.

A stated meeting of the Philadelphia College of Pharmacy was held this day at the hall of the College, No. 145 N. Tenth street.

In the absence of the President William B. Webb was called to the chair.

Fourteen members were present and signed the register.

The minutes of the last meeting were read and on motion adopted.

The minutes of the Board of Trustees for October, November and December were read by the Secretary of the College, and on motion approved.

These minutes contained the report to the Board of the Committee of Instruction, relative to the subject of preliminary examination of students in the English branches before entering the Junior Class.

Upon this subject considerable discussion took place, and Messrs. Blair

and Thompson thought that the examination, as conducted was not of a preliminary character in a proper sense, and requested an explanation of the working of the system adopted. They both expressed fears that it would be found to work unsatisfactorily.

Professors Remington and Sadtler explained the mode of examination as recently conducted, and gave it as their opinion that it had worked well so far, and gave promise of a satisfactory result at the end of the course. Messrs. Bullock, Boring and McIntyre acquiesced in these opinions.

Resignations were then read from the following gentlemen, members of the College, viz.: Messrs. Frederick C. Orth, John A. Witmer and Charles A. Kurlbaum. On motion they were all accepted.

Then on motion adjourned.

WILLIAM J. JENKS, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 16, 1884.

President Dillwyn Parrish in the chair.

The minutes of the last meeting were read and approved.

Prof. Trimble made some remarks upon *burdock fruit and oil*, only to state that in the chemical examination he had obtained indications of an alkaloid, which was being further investigated.

Prof. Trimble also read a paper upon *Polygonum Hydropiper*, or smartweed, which was referred for publication.

Prof. Remington read a paper upon the *advances in the instruction and requirements* of the Philadelphia College of Pharmacy. After the reading of the paper, the questions propounded for a preliminary examination in a Pharmaceutical institution were read and commented upon.

Mr. Thompson stated that he had listened attentively to the reading of the paper and was pleased to learn so much in regard to the courses of instruction; he must still say that he differed from the writer in one respect, that was that the methods pursued did not improve the character of the trade. We all know, he said, that it has degenerated, and he thought it was in part owing to the course of the College in not requiring its students to attain a certain standard before entering.

Professor Maisch said that in all European countries the laws required that a young man on *entering* the drug business as an *apprentice* should prove certain educational acquirements; but after such entrance there was no discrimination against obtaining further instruction in the pharmaceutical institutions.

Mr. Zeller presented a fine specimen of *kryolite*, and called attention to the specimens of *licorice* and *ammoniacal glycyrrhizin* made by Mellor & Rittenhouse and presented to the College Cabinet.

Mr. Wallace Procter presented a number of specimens of different articles that were the results of studies and examinations conducted by his father, the late Professor Procter. They were accepted with thanks.

A specimen of *Irish broom*, collected on the line of the Baltimore Railroad. Prof. Maisch stated that many years ago scoparius grew plentifully near Fairmount avenue and Twenty-second street.

There being no further business, on motion, adjourned.

T. S. WIEGAND, *Registrar.*

ALUMNI ASSOCIATION, PHILADELPHIA COLLEGE OF PHARMACY.

The third social meeting was held at the College hall on the afternoon of December 9, the President, Dr. C. A. Weidemann, in the chair. A very interesting lecture was delivered by Dr. J. M. Anders, the subject being "Diet and Drink." The lecturer passed in review the different classes of food—nitrogenous and non-nitrogenous, animal and vegetable, and the various drinks—water, milk, fermented liquors, coffee, tea, etc., and alluding to the physiological observations made with many of these, showed the adaptability of the different articles under various conditions. In the discussion following several speakers took the ground that wheat starch, which is cheaply produced in this country, is in every respect the dietary equivalent of the high-priced arrow-roots of tropical countries.

After various recitations and the reading of a paper, entitled "What is the Best Way to Wait on a Customer," the meeting adjourned.

EDITORIAL DEPARTMENT.

THE ENDORSING AND VENDING OF NOSTRUMS BY THE AMERICAN PHARMACEUTICAL ASSOCIATION.—Under this caption Mr. A. E. Ebert has sent us a communication, which we print below, and which seems to be intended to correct an error in the communication published on page 654 of our December number. Mr. Ebert apparently assumes that Mr. Shoemaker's remarks refer to the *representatives* of the American Pharmaceutical Association who were present at the St. Louis meeting of the National Wholesale Druggists' Association, while in point of fact, no allusion whatever was made to that delegation, Mr. Shoemaker distinctly saying: "There were present . . . . a very respectable delegation from the National Retail Druggists' Association . . . . some at least prominent *members* of the American Pharmaceutical Association." This fact is not disputed by Mr. Ebert, and the two sentences which we have italicized in his communication, clearly show that the facts, as stated by Mr. Shoemaker, are in accord with those observed by Mr. Ebert. The present communication, therefore, cannot be regarded as a *correction* of the previous one; but it is a *supplement* thereto, and an important one, since it shows that the delegation of the American Pharmaceutical Association was on the alert of avoiding compromises, repugnant to the history of the Association since its foundation. A synopsis of the position of this Association to nostrums and

secrecy in medicines was given by the Secretary at the meeting at Niagara Falls, and is published in the *Proceedings* for 1882, pages 641 and 642.

To the Editor of the American Journal of Pharmacy:

The December number of the "American Journal of Pharmacy" contains a communication from Mr. Robert Shoemaker, which in my opinion does great injustice to the membership of the American Pharmaceutical Association. Mr. Shoemaker makes the statement that at the St. Louis meeting of the National Wholesale Druggists' Association prominent members of the American Pharmaceutical Association were in attendance in the interest of nostrums, and the course pursued by them appeared as an endorsement of the importance and efficiency of this class of pretentious cure-alls and quack medicines. He further says: "I cannot help feeling that the worthy gentlemen *who participated in the debates on this subject* forgot for the moment their high calling as members of a truly honorable profession, and lost dignity in asking the convention to endorse as legitimate the very articles against which they should set their faces."

The writer confesses his inability to explain how the delegation of the American Pharmaceutical Association could be confounded with the officials of the National Retail Druggists' Association who were present at this meeting, and were so prominent in the debates and so active in urging upon the wholesalers the importance and necessity of the adoption of the so-called "Campion" or nostrum plan. It certainly was no fault of these gentlemen if those present were not impressed with the importance of their representations; for they claimed as their constituency the retail druggists of this hemisphere, or more correctly speaking, the space bounded on the east by the Atlantic and on the west by the Pacific ocean, to the north by Hudson Bay and to the south by the Gulf of Mexico; or in other words, if the space is not "figuratively" speaking empty, it means representing from 30,000 to 50,000 druggists.

When the delegation of the American Pharmaceutical Association presented their credentials, the chairman, Mr. Eno Sander, conveyed in a very happy manner fraternal greetings, and in a few brief remarks stated the objects of the American Pharmaceutical Association, the work undertaken and performed in the past, the work laid out for the present and future, coupling with this the hope that the National Wholesale Druggists' Association would be found in the ranks, marching side by side, and shoulder to shoulder with the American Pharmaceutical Asssciation in the noble struggle of promoting the progress and elevating the profession of Pharmacy in this country.

Subsequently, when the report on adulteration of drugs, and the recommendations from the committee as to what active measures be at once taken to expose and bring to punishment the guilty, was read and adopted, the writer asked the privilege of making a few remarks; this being granted, he, in behalf of the American Pharmaceutical Association, thanked the National Wholesale Druggists' Association, for the adoption of the report and the seeming very practical recommendations for correcting the existing evil, with which the American Pharmaceutical Association had been battling for the last thirty-three years, and it was most gratifying to learn that henceforth the two associations would be joined hand-in-hand in this labor of making marketable only pure and honest drugs.

The writer was present at all the sessions of the St. Louis meeting, and heard all the debates, and he does positively state that *at no time were there any remarks made by the representatives of the American Pharmaceutical Association, either pro or con, on the subject of nostrums* under consideraordebate by the Association. The delegation was very careful of not having the American Pharmaceutical Association connected with this question in any manner whatever; and when a manufacturer of this class of goods,

while advocating the Campion plan, undertook to drag in the American Pharmaceutical Association as endorsing the plan, the writer interrupted the speaker, and asked the gentleman to correct his statement as far as it related to the American Pharmaceutical Association, as the delegation present were in position to say that this Association did not favor the Campion or any other plan that *furthered the interests* of nostrums. The gentleman who had made the allusion accepted our corrections, and this adds to our perplexity of Mr. Shoemaker's charges, when he says: "One might have supposed, in listening to their long-continued and eloquent efforts, that the chief part of the business of the modern apothecary consisted in buying and selling proprietary remedies, secret preparations, of which they know nothing beyond the printed name, accompanied by certificates of those who had been miraculously cured by their use."

If Mr. Shoemaker will make the correction, that the remarks that were made at this meeting upon this subject of quack medicines, were not made by representatives of the American Pharmaceutical Association we will admit that it was a deplorable situation to listen to the remarks of men who are at the head and front of the National Retail Druggists' Association, and by their cringing and whining appeals brought the tingling of shame upon the cheeks of all such who have the welfare of Pharmacy at heart. However, a lesson can be learned, and attached is a moral: Scan the representations of the Colleges of Pharmacy located east of the Alleghanies at the Milwaukee meeting of the American Pharmaceutical Association.

If Pharmacy is degenerating, where are the existing evidences of it? Where is the dangerous shallow shore with its hidden reefs and turbulent surf? Let us from this time on place competent and tried men at the helm of our ship of organization and we will be certain to steer clear of the breakers, whether they are east or west, north or south, and should the sea become too heavy, we will lighten our craft by throwing overboard the nostrums, regain the deep and safe wide expanse of the open, calm sea, and make a prosperous journey in our ship of Pharmacal Progress.

Respectfully,

ALBERT E. EBERT.

CHICAGO, December 23, 1884.

DESTRUCTION OF SCIENCE HALL, UNIVERSITY OF WISCONSIN.—On the evening of December 1, a fire broke out in the engine room of Science Hall, one of the buildings of the University of Wisconsin, at Madison. It resulted in the total destruction of the building, which was four stories in height, the central building being 79 by 52 feet in dimension, while the two wings were 109 feet long and 42 feet wide The cost of the building exceeded $94,500, independent of its furnishings and later expensive improvements, and it contained besides various lecture rooms, laboratories for investigations in physics, chemistry and mineralogy, and collections of art and natural history. Many of the specimens cannot be replaced, and the results of years of labor by several of the professors have been lost.

Serious as the loss has been by this calamity, the faculty, with commendable energy, proceeded at once to make the best possible arrangements for continuing without interruption the instruction of the students in the remaining buildings. The pharmaceutical, botanical, and agricultural departments were not directly sufferers, though they naturally must experience more or less inconvenience through the destruction of the laboratories and cabinets mentioned above.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A Manual of Organic Materia Medica. Being a Guide to Materia Medica of the Vegetable and Animal Kingdoms, for the use of Students, Druggists, Pharmacists and Physicians. By John M. Maisch, Phar. D., Professor of Materia Medica and Botany in the Philadelphia College of Pharmacy. Philadelphia: Lea Brothers & Co., 1885. 12mo. pp. 511.

Just three years ago the first edition of this work was published; it was noticed on page 39 of this Journal, 1882. The edition was completely exhausted fifteen months ago; but the appearance of the second edition was delayed owing to the author's labors in connection with the recently published "National Dispensatory." In the work now before us the arrangement of the material remains substantially the same as before, but somewhat more prominence has been given to the histological characters of vegetable drugs, and those drugs, which are no longer recognized by the United States Pharmacopœia, as a rule, are distinguished by the more closely printed text from the pharmacopœial drugs, among the latter being included several of which preparations or constituents only have been admitted into the Pharmacopœia, like Cocculus indicus, which is not recognized by the Pharmacopœia, except through its poisonous constituent picrotoxin. A number of drugs have also found a place in the Manual which have been recently recommended, and others of American origin which are in more or less extended use in different sections of the country. While the number of drugs treated of has thus been increased, the text has been revised so as to embrace the results of all investigations, as far as they come within the scope of the work. A number of the old wood cuts have been replaced by new and more characteristic ones, and others have been added where it was deemed desirable, the total number being 242, or an increase of about 50. A list of "drugs arranged according to origin" covering 22 pages, has been added; it embraces both drugs derived from animals and from plants. The latter list is necessarily the largest of the two and will be useful for the comparison of drugs furnished by botanically allied plants, and will also be of service to the student of medical botany. That paper and typography are excellent need merely be mentioned.

The Basic Pathology and Specific Treatment of Diphtheria, Typhoid, Zymotic, Septic, Scorbutic and Putrescent Diseases Generally. By Geo. J. Ziegler, M. D., etc. Philadelphia: Geo. J. Ziegler, M. D., 1884. 8vo, pp. 225. Price $2.

The author endeavors to show that the diseases mentioned upon the title page are dependent upon, or complicated with, one common basic, alkaline, pathogenic factor, mostly the volatile alkali ammonia, and that the successful treatment must be based upon the neutralization or removal of this morbific factor. The subject is discussed under the following headings: 1. Introduction; 2. Ætiology and Pathology; 3. Treatment; 4. External Treatment; 5. Prevention; 6. Conclusions.

The Life Work of Carl Wilhelm Scheele. By B. Frank Hays, Ph.G. New York: P. W. Bedford, 1884. Pp. 14.

The paper was read before the Alumni Association of the College of Pharmacy of the City of New York, and published in the "Pharmaceutical Record," December 1, 1884.

List of Tests (Reagents) arranged in alphabetical order according to the names of the originators. Translated from the German of Mr. Schneider (Dresden), with additions from various sources. By Hans M. Wilder. New York: P. W. Bedford, 1884.

This list contains one hundred and sixty-four tests, which need some corrections. The test for carbolic acid with pine wood moistened with hydrochloric acid is attributed to Hoppe-Seiler, but was first suggested by Runge. Jungmann's test with phosphomolybdic acid and ammonia was recommended for arbutin, not for alkaloids. Dragendorff recommended testing for alcohol in essential oils by sodium; the test giving potassium in place of sodium is erroneously attributed to Maisch, who recommended caustic potassa for the detection of nitrobenzol in oil of bitter almonds.

Fifth Annual Report of the State Board of Health, Lunacy and Charity of Massachusetts. Supplement containing the Report and Papers on Public Health. Boston: Wright & Potter Printing Co., 1884. 8vo, pp. 282.

Of particular interest to pharmacists are the reports of the analysts on food, milk and on drugs, and a paper entitled "Arsenic as a domestic poison." In glancing over these reports we have not observed that any new hitherto unknown adulterants have been detected. The last paper mentioned shows that arsenical colors for papers and arsenical dyes are still largely used, although their dangerous character has been often shown.

The Plaster of Paris Dressing in the Treatment of Fractures. By W. O'Daniel, M. D., Bullards, Georgia.

Reprint from the Transactions of the Medical Association of Georgia.

Pharmaceutical Journals.—A year ago "New Remedies" changed its title to "American Druggist," and the "St. Louis Druggist" to the "National Druggist." Now the "Druggist" published in Chicago has been converted into the "Western Druggist." This last mentioned paper has at the last meetings of the American and of the Illinois Pharmaceutical Associations published daily editions containing not merely a synopsis of the business done at these meetings, but likewise a good portion of the discussions and the papers, in abstract or entire, which were read at the meetings.

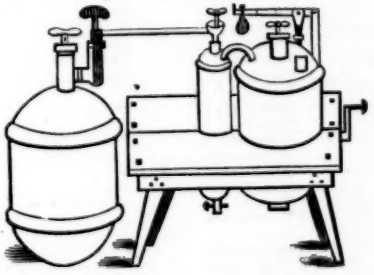
The "Pharmacist," which is published by authority of the Chicago College of Pharmacy, has been placed under the editorial management of Prof. Oscar Oldberg, whose learning and experience in pharmaceutical practice, literature and education will doubtless be impressed upon the course of our valued cotemporary.

OBITUARY.

JOSEPH JANVIER WOODWARD, M. D., Major and Brevet Lieut. Colonel U. S. A., died near Philadelphia, August 18th, aged fifty-two years. He graduated from the University of Pennsylvania in 1853, was appointed Assistant Surgeon U. S. A. in 1861, and in 1866 was assigned to the duty of editing the "Medical and Surgical History of the War of the Rebellion." His labors in connection with this work as well as with the Army Medical Museum, and more particularly his microscopical researches and photographing, gained for him a world-wide reputation. Dr. Woodward had been ailing for several years, and on several occasions visited Europe for the benefit of his health.

ROBERT EMPIE ROGERS, M. D. died suddenly in Philadelphia, September 6th, last, aged seventy years. He graduated in medicine from the University of Pennsylvania in 1836, was afterwards Professor of Chemistry in the University of Virginia, the University of Pennsylvania and the Jefferson Medical College. The chair in the last institution, made vacant by his death, was filled by the appointment of Prof. J. W. Mallett of the University of Virginia.

JAMES T. LUKENS died in Philadelphia November 30, being in the seventy-eighth year of his age. He learned the trade of carriage making, and was subsequently, for a number of years, engaged in the manufacture of mineral water, the firm being Lukens & Lippincott, and the business



from which Mr. Lukens retired many years ago being still carried on by the successors of the other partner. The annexed cut represents the first soda water apparatus constructed by the deceased.

We have been informed of the decease of the following graduates of the Philadelphia College of Pharmacy:

JOHN H. PALETHORP, Class 1854, graduated afterwards in medicine from the University of Pennsylvania, and was for a number of years engaged in the real estate business.

EDWARD JEFFERSON, Class 1873, died suddenly at Atlanta, Georgia, from an overdose of morphine taken to relieve uræmic convulsions.

JOHN L. WILLIAMS, Class 1874, was killed by being thrown out of a carriage near Bloomfield, Perry County, Pa., September 4th, last.

C. FRANK MOORE, Class 1877, died at North East, Md., of brain fever aged twenty-nine years. He was engaged in the drug business at Cherry Hill, Md.

ROBERT F. FINCK, Class 1884, died December 10, aged twenty-six years.

CLASS OF THE PHILAD'A COLLEGE OF PHARMACY.

SIXTY-FOURTH ANNUAL SESSION, 1884—1885.

JUNIOR CLASS.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Abell, William Warner,	Philada.,	Pa.	W. B. Abell.
Albright, Charles Wesley,	Camden,	N. J.	H. O. Cox, M. D.
Alexander, Everett Vincent.	McConnelsville,	Ohio.	John Alexander.
Allen, David Roberts,	Paris,	Ky.	F. Keegan.
Arnold, Claude Horace,	Clifton Springs,	N. Y.	Joseph Hinds.
Ashton, Charles Butterworth,	Norristown,	Pa.	William Stahler.
Aubley, Samuel,	Scottdale,	Pa.	J. M. McNeil.
Backes, Thomas Joseph,	Trenton,	N. J.	E. P. Camp.
Baer, Jacob Michael,	Hanover,	Pa.	J. T. Shinn.
Baker, David Wiley,	Trenton,	N. J.	I. W. Kelly.
Balbeirnie, Harold,	Philada.,	Pa.	E. C. Tomlinson.
Barlow, Louis Eugene,	Galion,	Ohio.	B. W. Bethel.
Barrowman, William G.,	Scranton,	Pa.	Thomas Barrowman.
Beale, Benjamin,	Philada.,	Pa.	E. Beale, M. D.
Bear, John H.,	Philada.,	Pa.	E. B. Garrigues & Co.
Becker, Henry Vane,	Fort Wayne,	Ind.	C. E. Spencely.
Beevers. Joseph,	Ridley Park,	Pa.	W. L. Hinchman.
Benner, Isaac,	Philada.,	Pa.	S. Rosenberger, M. D.
Bernardy, Emile Seraphin,	Philada.,	Pa.	H. Llewellyn.
Berret, Arthur,	Reading,	Pa.	W. A. Musson.
Bickley, Milton Horace,	Chester,	Pa.	M. H. Bickley.
Bicknell, Robert Cooke,	Madisonville,	Tenn.	
Birt, Frank John,	Trenton,	N. J.	Arthur Schwartz,
Blanding, E. L.,	Auburn,	N. Y.	C. H. Sayre.
Blickensderfer, Herman,	Tuscarawas,	Ohio.	Bullock & Crenshaw.
Bonnet, Charles Frederick,	Zanesville,	Ohio.	E. E. Hazlett.
Bowman, Lin. Light,	Camden,	N. J.	U. F. Richards.
Boyd, John Charles,	Paris,	Ills.	I. B. Addberger.
Brecht, Morris Winfield,	Lancaster,	Pa.	C. A. Heinitsh.
Brehman, Charles Schaeffer	Philada.,	Pa.	
Breneiser, Edgar,	Reading,	Pa.	J. H. Stein.
Brownley, Charles Jackson,	Portsmouth,	Va.	W. G. Day.
Bryson, Charles Hodge,	Reading,	Pa.	J. B. Raser.
Buckley, James Edward,	New Tacoma,	W. T.	J. F. Hayes.
Burg, John Dellinger,	York,	Pa.	H. A. Hay.
Burk, Alfred Gray,	Flemington,	N. J.	H. P. Lechler.
Burkhart, Herman Adolphus,	Bethlehem,	Pa.	E. H. Lackenbach.
Butts, Simon Mark,	Gettysburg,	Ohio.	D. S. Brumbaugh.
Cahill, Daniel William,	Watertown,	N. Y.	H. G. P. Spencer & Son.
Campbell Henry Belling,	Bridgeton,	N. J.	Fred. Seitz.
Carmack, George Winnoll,	Phœnixville,	Pa.	H. B. Taylor.
Carroll, Sherman Lincoln,	Philada.,	Pa.	P. G. A. Weber.
Carter, Charles Lowber,	Lewes,	Del.	T. O. Nock.
Chamberlain, John Maurice,	Oxford,	Pa.	S. H. Shingle.
Cheney, Walter Bowden,	South Manchester,	Conn.	W. H. Cheney.
Clenahan, Samuel John,	Lansingburg,	N. Y.	Barker, Moore & Mein.
Cohn, Arthur H.,	Milwaukee,	Wis.	L. Lotz.
Colborn, Isaiah Grant,	Ashland,	Pa.	W. F. Colborn.
Comp, Harry Gerhart,	Mt. Joy,	Pa.	C. H. Clark.
Cummings, Charles Samuel,	Schuylkill Haven,	Pa.	H. N. Cox.
Comp, Harry Gerhard,	Mt. Joy,	Pa.	Charles H. Clark.
Craig, Edwin Sherman,	Shreve,	Ohio.	T. M. Johnson.
Creighton, Orville Sharp,	Somerton,	Ohio.	B. F. Creighton.
Danzberger, George William,	Chambersburg,	Pa.	J. S. Nixon & Son.
Davis, Alfred Ivins,	Pemberton,	N. J.	S. S. Collom.
Davis, William Harry,	Coatesville,	Pa.	George W. Davy.
Deibert, Thomas Irvin,	Pottsville,	Pa.	G. W. Kennedy.
Devine, Oliver Crawford,	Philada.,	Pa.	Dr. McVickar.
Donnell, George, James,	Clifton Heights,	Pa.	G. R. Vernon, M. D.
Downes, Clarence Eugene,	Denton,	Md.	T. O. Nock.
Downes, Randolph Hinson,	Templesville,	Md.	F. A. Sanderson.
Dunning, Floyd Morse,	Mt. Morris,	N. Y.	N. A. Seymour.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Eagle, Charles Augustus,	New Castle,	Del.	
Emerson, Henry Everett,	Milford,	Pa.	
Elden, William McKee,	Columbia,	Pa.	P. S. Brugh.
Falloure, Edwin Reed,	Wheeling,	W. Va.	J. B. Reynolds.
Faust, John K.,	Reading,	Pa.	J. H. Stein.
Ferguson, James Adams,	Philada.,	Pa.	J. B. Ferguson.
Fisher, Jacob Livingood,	Punxsatawney,	Pa.	T. O. Nock.
Fletcher, Oscar Conrad,	Franklin,	Ky.	R. H. Moore.
Flynn, John Joseph,	Mt. Holly,	N. J.	J. H. Hulme.
Focht, Jacob Mauger,	Pottstown,	Pa.	Dr. M. A. Withus.
Forsyth, George Washington,	Farmingdale,	Pa.	W. W. Trout.
Fry, Albert Algert,	Pleasant Valley,	Pa.	Dr. M. H. Weaver.
Gardner, Francis Edward,	York,	Pa.	B. F. Johnson.
Geilfuss, Alfred Victor,	Philada.,	Pa.	J. A. Martin.
Gill, Charles Alfred,	Philada.,	Pa.	A. W. Wright & Co.
Glenn, Benjamin Franklin,	Pottsville,	Pa.	G. W. Cox.
Goodman, Oscar Peter,	Omaha,	Neb.	C. F. Goodman.
Graf, Albert Frederick,	Philada.,	Pa.	J. R. Elfreth.
Graham, Percy Malcolm,	Philada.,	Pa.	French, Richards & Co.
Grant, James Smith,	Frostburg,	Md.	G. A. Wingert.
Greenawalt, William Grant,	Chambersburg,	Pa.	C. H. Cressler.
Griffith, Lycurgus Edward, Jr.,	Terrell,	Texas.	Dr. L. E. Griffith.
Grigg, Wilmer,	Greensboro,	Ala.	Dr. John Randolph.
Hall, Frank Devie,	Newark,	Ohio.	H. H. Ross.
Hall, Harry Newberry,	Aguas Calientes,	Mexico.	H. S. Squires M. D.
Hall, Willey Harrison,	Fairmont,	W. Va.	Logan, Carr & Co.
Harrigan, John William.	Philada.,	Pa.	R. R. Stewart, M. D.
Harrison, Thomas Wesley,	Philada.,	Pa.	Fred C. Lehman.
Hartzell, William Lincoln,	Philada.,	Pa.	J. G. Howard.
Haskarl, William Samuel,	Philada.,	Pa.	R. R. Stewart, M. D.
Hauck, Allen Wesley,	Lebanon,	Pa.	S. C. Blair M. D.
Haugaard, Peter,	Schleswig Holstein,	Germany.	Louis Murjahn.
Heiberger, Milton Ulysses.	Philada.,	Pa.	
Heller, Charles Tomkins,	Bridgeton,	N. J.	J. L. Curry.
Henderson, Clarence Rulin,	Titusville,	Pa.	C. E. Peck.
Henderson, James Rutledge,	Spartensburg,	S. C.	H. E. Heinitsh.
Hergesheimer, David Shaid,	Germantown,	Pa.	C. L. Eberle.
Hettinger, Howard Huyett,	Reading,	Pa.	J. B. Raser.
Hiecke, William.	Milwaukee,	Wis.	Otto Schorse.
High, Edmund Gilbert,	Philada.,	Pa.	Hance Bros. & White.
Hill, George Bruce,	Hazelton,	Pa.	McNair & Hongland.
Hinterleitner, George Gustav,	Pottsville,	Pa.	
Hoffmann, George William Jacoby,	Terre Haute,	Ind.	T. S. Wiegand.
Hollberg, Ferdinand.	Macon,	Miss.	J. F. Jones.
Holland, Edgar Attwood,	Frazer,	Pa.	C. E. Davis.
Holloway, Henry Ward Beecher.	Akron,	Ohio.	C. H. Aughinbaugh.
Hooper, Edward Hayward,	Dorchester Co,	Md.	Bullock & Crenshaw.
Hooper, Sidney Lee,	Philada.,	Pa.	O. P. Hooper.
Horn, Henry Montford,	Lone Pine,		W. O. Higgate, M. D.
Horner, Kasper	San Antonio,	Texas.	L. Orynski.
Hughes, John Cooper,	Richmond,	Ky.	White & Stockton.
Hulshizer, John Clayton,	Hughesville,	Pa.	W. J. Schaeffer.
James, William Megargee,	Doylestown,	Pa.	G. T. Harvey, M. D.
Johnson, Seely Adams,	Atlantic City,	N. J.	Willard Wright, M. D.
Johnson, Seth Caleb,	Absecom,	N. J.	J. P. Waters.
Johnstone, Henry Havelock,	New Castle,	N. B.	E. Lee Street.
Jones, Samuel Stephen,	Wilkesbarre,	Pa.	M. Syphers.
Judge, John Aloysius,	Philada.,	Pa.	Dr. J. M. Wallis.
Keck, Frank Peter,	Allentown,	Pa.	Harzell, Smith & Co.
Keim, Asher D.,	Bethlehem,	Pa.	Paul Kempsmith.
Kelly, William Daniel.	St. Paul,	Min.	W. S. Getty.
Keogh, Francis Joseph,			J. Wyeth & Bro.
Kiedaisch, John Fred.,	Keokuk,	Iowa.	C. Shivers.
Kiefer, John.	Loudonville,	Ohio.	D. F. Shull & Co.
King, Everett Lincoln,	Philada.,	Pa.	T. M. Galbreath.
Kizer, Thomas Joseph,	Winchester,	Ind.	
Klopfenstein, John A.,	Galion,	Ohio.	L. R. Reisinger.
Kooker, Jacob Glaes,	Norristown,	Pa.	F. H. Poley.
Kremers, Edward.	Milwaukee,	Wis.	L. Lotz.
Kroh, Henry Kiefer,	Conshohocken,	Pa.	J. W. Harry.
Kuhn, Gustav Otto, Jr.,	Philada.,	Pa.	A. F. Gerhard.
Kurtz, David H.,	Blue Rock,	Pa.	J. B. Raser.
Lache, Oscar Julius,	Philada.,	Pa.	W. B. Webb & Co.
Lackey, Richard Henry,	Philada.,	Pa.	Girvin & Co.
Lafean, Edward Charles,	York,	Pa.	L. E. Sayre.
Laferty, Jacob Eber,	Philada.,	Pa.	C. C. Vanderbeck.
Lantz, John Joseph.	Philada.,	Pa.	W. H. Lantz.
Law, George Fuller,	Willoughby,	Ohio.	
Leitch, Charles Thomas,	Applelackville,	Pa.	G. W. Clymer & Co.

Matriculans.	*Town or County.*	*State.*	*Preceptor*
Letzkus, William George,	Lockhaven,	Pa.	T. C. Hilton.
Lintner, John Rathfon,	Lancaster,	Pa.	W. H. Koons.
Loewenthal, William,	Evansville,	Ind.	G. Appenzoller.
Long, John Nathan Grier,	Honeybrook,	Pa.	J. P. Remington.
Longshore, John Liggett,	Mansfield,	Ohio.	Perkins Bigelow.
Loughead, Raymond Blythe,	Chester,	Pa.	G. Banks Wilson.
Loughridge, Samuel L.,	Philada.,	Pa.	John Bley
Lunney, Alexander Browne,	Darlington,	S. C.	Dr. J. Lunney.
Macfarland, Burr William,	Bordentown,	N. J.	Wilson Cutter.
Maurer, George Bright,	Reading,	Pa.	F. X. Wolf.
Mawhinny, Frank, Jr.,	Philada.,	Pa.	Keasby & Matteson.
McClenachan, John Thomas,	Galveston,	Texas.	C. C. Watson & Co.
McCoy, Clarence Herbert,	Lebanon,	Ill.	W. A. Nelden.
McConnell, Charles Henry,	Philada.,	Pa.	D. F. Shull & Co.
McKee, Joseph.	Bordentown,	N. J.	H. F. Seely.
McNeil, George,	Nanticoke,	Pa.	S. W. Sutliff.
McNeil, Robert Carson,	Philada.,	Pa.	R. McNeil, Jr.
Mayo, Caswell Armstrong,	Columbus,	Miss.	J. P. Bolton.
Means, Samuel Robert,	Lewistown,	Pa.	D. L. Stackhouse.
Meek, William Henry,	E. Douglass,	Mass.	J. F. Smith & Co.
Melot, Irvin G.	Reading,	Pa.	
Miller, Jeremiah L.,	Topton,	Pa.	W. F. Maulick.
Miller, Joseph Charles,	Philada.,	Pa.	Charles Bauer.
Miller, Luther Austin,	Steubenville,	Ohio.	M. L. Miller.
Moffet, John,	Philada.,	Pa.	John Moffet.
Moffitt, Edward Thomas,	Scranton,	Pa.	L. E. Sayre.
Moller, John Daniel,	Philada.,	Pa.	William Delker.
Moyer, E. O.,			
Moyer, William Ervin,	Allentown,	Pa.	S. Gerhard.
Muir, John Robert,	Lockhaven,	Pa.	E. S Muir.
Munson, James Harry,	Lancaster,	Pa.	J. B. Moore.
Neely, Charles Godfrey,	York Springs,	Pa.	H. C. Blair's Sons.
Neil, William Edgar,	Moundsville,	Wis.	Bullock & Crenshaw.
Nelson, William Heisley,	Philada.,	Pa.	Smith, Kline & Co.
Nieman, Levi Allen,	York,	Pa,	S. Howard Shingle.
Nuhn, George Christian,	Philada.,	Pa.	C. C. Spannagel.
Oetinger, Albert,	Philada.,	Pa.	J. R. Angney, M. D.
Ohl, William,	Peoria,	Ill.	Sutliff, Shultz & Co.
Ousey, L. B.,	Clifton Heights,	Pa.	Barker, Moore & Mein.
Outhwaite, Charles William,	Canada,		Wiley & Harris.
Outten, Elmer,	Philada.,	Pa.	Dr. S. D. Marshall.
Pantzer, F. William,	Sheboygan.	Wis.	M. R. Zaegel & Co.
Pechin, George Joseph.	Philada.,	Pa.	C. D. Frame & Co.
Pinchback, Pinckney Napoleon,	New Orleans,	La.	Wiley & Harris.
Platt, Alfred Clark,	Ansonia,	Conn.	C. E. Bristol.
Pochner, Adolph Adam,	Philada.,	Pa.	J. Wyeth & Bro.
Porter, William David,	Mahony City,	Pa.	C. D. S. Früh.
Pothier, Almer Warren,	Strong,	Maine.	H. C. Watt.
Prewitt, Samuel Washington,	Columbia,	Tenn.	W. P. Woldridge.
Price, Frank,	Philada.,	Pa.	O. L. Coles.
Prickitt, Frank W.,	Mt. Holly,	N. J.	Louis Miller.
Rambo, Samuel Lee,	Logan,	Ill.	F. Harrington.
Ranftle, Oscar,	Long Island City,	N. Y.	George Goetting.
Rayner, Howard Lincoln.	Norristown,	Pa.	R. Shoemaker & Co.
Ream, Lake Jay.	Somerset,	Ohio.	O. B. Ream.
Reighter, Frank Clymer,	Carlisle,	Pa.	W. F. Horn.
Rentschler, Charles,	Bernville,	Pa.	J. A. Gingrich.
Rhoads, Harry Franklin,	Lancaster,	Pa.	French, Richards & Co.
Richter, Gustav A.,	Philada.,	Pa.	W. Proctor, Jr. & Co.
Rinedoller, Charles Wesley,	Philada.,	Pa.	C. G. Frowert, M. D
Ringler George Parson,	Bloomsburg,	Pa.	Meyer Bros.
Risher, Henry Cook,	Waco,	Texas.	Castles Morrison.
Rixstine, Livingston Everett,	Phœnixville,	Pa.	R. S. Keeler & Co.
Roberts, Bolivar, Jr.,	Salt Lake City,	Utah.	Roberts & Nelden.
Roberts, Joseph V. Culin,	Philada.,	Pa.	George V. Eddy.
Robbins, George Hendricks,	Philada.,	Pa.	C. C. Vanderbeck.
Rolff, Julius,	Canada,		L. E. Sayre.
Roseberry, John Mackey,	Phillipsburg,	N. J.	W. D. Robinson, M. D.
Rosenbaum, David,	Mt. Vernon,	Ind.	Emil Graff.
Rottner, Charles Selmar,	Philada.,	Pa.	P. Röttner.
Sample, Nathaniel Welshard,	Wilmington,	Del.	Z. James Belt.
Sangston, James Allen,	Greensboro,	Md.	A. L. Belleville.
Saurer, William Henry,	Philada.,	Pa.	C. B. Haenchen.
Savage, Thomas Albert,	Germantown,	Pa.	William Conner.
Scarborough, George W.,	Philada. ,	Pa.	Thomas D. Brown, M. D.
Schnatz, Eugene Phillip,	Germany,		G. D. Wetherill & Co.
Schock, Fred Albert,	Philada.	Pa.	E. R. Burdick.
Seales, Charles Burgundy,	San Francisco,	Cal.	S. P. Churchill.
Seary, William Notson,	Philada.,	Pa.	W. Notson, M. D.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Seekel, Guy, Jr.,	Philada.,	Pa.	G. D. Wetherill & Co.
Seither, Charles Albert,	Philada.,	Pa.	Bullock & Crenshaw.
Shead, Almon Ami,	Milwaukee,	Wis.	J. A. Dadd.
Shoemaker, George Washington,	Hummelstown,	Pa.	J. F. Marquandt.
Slaughter, John Virgil,	Rio Grande,	N. J.	T. S. Bartram.
Smith, Aloysius John,	Philada.,	Pa.	G. D. Wetherill & Co.
Smith, Frank F.,	Richmond,	Ind.	A. G Luken & Co.
Smith, Joseph,	Wilmington,	Del.	B. Smith.
Smith, Worden Lorimer,	Snydertown,	Pa.	
South, Harry Grant,	Philada.,	Pa.	Dr. W. S. Higbee.
Spalding, Charles,	Austin,	Texas.	J. J. & W. H. Tobin.
Stahler, Harry,	Norristown,	Pa.	William Stahler.
Starr, John William,	Middletown,	Pa.	J. W. Rewalt.
Stauffer, William Morrison,	Quincy,	Pa.	F. Forthman.
Stearns, Isaac	Cincinnati,	Ohio.	M. Stearns.
Stevenson, Wellington,	Aiken,	S. C.	
Stites, Charles Linford,	Cape May,	N. J.	Marcy Mecray.
Strunk, Lewis Curton,	Quakertown,	Pa.	S. W. Strunk.
Sunderland, Henry,	Philada.,	Pa.	J. F. Wilgus.
Super, Albert,	Philada.,	Pa.	B. W. Fetters.
Supplee, William Edward,	Norristown,	Pa.	E. A. Stahler.
Sutton, William Henry,	Philada.,	Pa.	F. H. Bassett & Co.
Suydam, John Derr,	Philada.,	Pa.	T. E. Conard.
Swansen, Charles Adolphus,	Jamestown,	N. Y.	F. W. Palmeter.
Switzer, Luin Burt,	Bath,	N. Y.	J. P. Russell.
Todd, John Charles,	Manayunk,	Pa.	W. C. Todd, M. D.
Trauck, Charles Cadrick,	Bucks Co.,	Pa.	E. C. Jones & Co.
Tretbar, George Brown,	Philada.,	Pa.	W. H. Walling.
Vincent, Lorren S.,	Flin ,	Mich.	
Wagner, William Finley,	Hardleton,	Pa.	Newbold Bros.
Wallace, Edwin Corby,	Springfield,	Ohio.	Harry Cox.
Ward, Christopher Columbus,	Crisfield,	Md.	D. W. Blake, M. D.
Ward, Joseph Antonio,	Wilmington,	Del.	Z. Fleming.
Ware, William Reed,	Atlanta,	Georgia.	L. H. Bradfield.
Warren, Nathan Chew,	Upland,	Del.	C. L. Lachell.
Wayman John Martin,	Wheeling,	W. Va.	Edmund Bocking, Sr.
Week, Charles Erastus,	Clyde,	Kansas.	P. McDonald.
Weyand, William Jacob,	Philada.,	Pa.	Stansbruy & Bibby.
Whitaker, William Herbert,	Frederica,	Del.	W. E. Knowles.
Wiedmayer, Frederick William,	Leetonia,	Ohio.	J. E. Duff.
Wild, Charles Ferdinand,	Philada.,	Pa.	L. Wolff & Co.
Wilkinson Edwin Harmon,	Cleveland,	Ohio.	Strong, Cobb & Co.
Williams, Joseph Pearson,	Wilmington,	Del.	J. M. Harvey.
Wilson, George Thomas,	Franklin,	Ky.	William Swan.
Wingender. Wendel Phillips,	Camden,	N. J.	G. D. Burton.
Winslow, Colburn Thue,	Benezet,	Pa.	A. M. Wilson.
Wissler, Benjamin Abraham,	Millersville,	Pa.	Dr. Reeder.
Wyeth, Maxwell,	Philada.,	Pa.	J. Wyeth & Bro.
Yealy, James Frank,	Bellefonte,	Pa.	John Harris.
Young, Frank John,	Detroit,	Mich.	E. S. Power, M. D.
Young, Robert Taylor,	Coatesville,	Pa.	J. W. March & Co.
Young, William Schrack,	Philada.,	Pa.	W. H. Llewellyn.

SENIOR CLASS.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Abou, Joseph William,	Clinton,	Miss.	Dr. P. Fitch.
Amsden, Geo. Sidney,	Manchester,	Iowa.	E. J. Congar.
Anthis, Philip.	Pittsburg,	Pa.	J. L. Wessel.
Ball, John Alexis,	Philada.,	Pa.	R. D. Jones, M. D.
Barker, James Henry,	Plaquemine,	La.	S. Hiriart.
Bartel, Max,	Milwaukee,	Wis.	F. W. Hartwig.
Bechberger, Henry,	Sandusky,	Ohio.	J. H. Emrick.
Bell, Robert Matthew,	Philada.,	Pa.	Dr. C. J. Nice.
Bender, William Piper, Jr.	Camden,	N. J.	Dr. J. R. Angney,
Bichy, William,	Buffalo,	N. Y.	W. A. Rumsey.
Biddle, Richard,	Philada.,	Pa.	
Bishop, Samuel Walter,	Beverly,	N. J.	H. C. Van Meter.
Bissell, Wayne Barker,	Waterville,	N. Y.	E. G. Bissell.
Bogart, Chas. Mount,	South Amboy,	N. J.	G. W. Jacques.
Bowers, Luther Pascal,	Jefferson,	Md.	Warrington & Pennypacker.
Bozenhard, William Theodore,	Dayton,	Ohio.	Benkert & Co.
Braddock, Chas. Shreve,	Haddonfield,	N. J.	Isaac A. Braddock.
Brandner, Henry, Jr.,	Atchison,	Kansas.	G. A Chapman & Co.
Brehman, Charles Schaeffer,	Philada.,	Pa.	
Brown, Albert Edward,	Mobile,	Ala.	B. Ward.
Brown, Frank L.,	Chester.	Pa.	J. M. Stover.
Bullock, William Anthony,	Philada.,	Pa.	Bullock & Crenshaw.
Burke, Wm. Thompson,	Bristol,	Pa.	Alex. Kennedy.
Cadmus, Robert Clark,	Philada.,	Pa.	Dr. W. J. McCleane.
Cafky, Wm. Walter,	Jacksonville,	Ill.	W. E. Lee.
Cahoon, Edward Daley,	Dover,	Del.	F. Rapp.
Carnan, George Lewis,	Mt. Laurel,	N. J.	G. M. Smyser.
Champion, Carleton Cole,	Philada.,	Pa.	Bullock & Crenshaw.
Christ, Chas. Wesley,	Selinsgrove,	Pa.	E. J. Lehman.
Cohen, Nathan Alexander,	Selinsgrove,	Pa.	H. A. Borell.
Coltman, Thos. Clement,	Jenkintown,	Pa.	J. W. Ridpath.
Cooley, James Sherman,	Flemington,	N. J.	A. B. Allen.
Craythorn, Chas. John,	Beverly,	N. J.	A. W. Taylor, M. D.
Crothers, Samuel Ross,	Zion	Md.	F. W. E. Stedem.
Dallett, Prosper Martin,	Philada.,	Pa.	Bullock & Crenshaw.
Davis, Fred. Horace,	Camden,	Del.	T O. Nock.
Davison, Blythe James,	Canton,	Pa.	N. W. Whitman.
Deakyne, Oscar Boone,	Wilmington,	Del.	J. H. Morgan.
Deem, David Ferguson,	Union City,	Ind.	D. H. Ross.
De Long, Wm. Edward,	Bangor,	Pa.	S. F. Ware.
Dennison, Ulysses Grant,	New Castle,	Del.	H. C. Walker.
Dennisson, Geo. Eicholtz.	Downington,	Pa.	J. V. Antill.
Denniston, Wm. Milliken,	Hollidaysburg,	Pa	F. H. West.
De Reeves, Eugene.	Trinity,	Texas.	G. W. Shingle.
Deusche Wm. Dilk,	Chilicothe,	Ohio.	John A. Nipgen.
Dickeson, Morton Phelps	Media,	Pa.	W. T. W. Dickeson, M. D.
Diefenbeck, Henry,	Allegheny City,	Pa.	J. T. Hoskinson, Jr.
Dielman, Louis Henry,	New Windsor,	Md.	T. O. Nock.
Donough, Wm. Edgar,	Bernville,	Pa.	M. A. Davis.
Dreiss, Edward Frederick,	San Antonio,	Texas.	Adolph Dreiss.
Drew, Damer,	Warsham,	Va.	H. C. Manlove.
Dunbar, Thomas, Jr.	Philada.,	Pa.	J. W. Dallam & Co.
Dunn, Fred.,	Philada.,	Pa.	J. M. Rudolph.
Dunn, Walter,	Clifton Heights,	Pa.	A. Tatem.
Ebeling, Geo. Henry,	Wheeling,	W. Va.	Thos. H. Potts.
Eberly, Jacob Addison,	Mechanicsburg,	Pa.	Dr. H. Muller.
Edmonds, George Washington,	Philada.,	Pa.	Martin & Sommers.
Eisenhart, Foster Benjamin,	Hellertown,	Pa.	Wm. F. Owens.
Eldredge, Joseph Johnson,	Cape May City,	N. J.	Marcy & Mecray.
Ely, Samuel S.,	Philada.,	Pa.	Wiley & Harris.
Engler, John George,	Hartford,	Conn.	A. Maverick, & Co.
Evans, Geo. Brinton,	Plymouth,	Pa.	D. K. Spry.
Fahey, Edward H.,	Wilmington,	Del.	H. K. Watson.
Fearheller, Theodore,	Philada.,	Pa.	W. H. Lacey.
Fetter, Henry Herman,	Philada.,	Pa.	J. A. Witmer.
Fetterolf, Daniel Webster,	Ashland,	Pa.	S. A. Marshall.
Fienhold, Edward Henry,	Philada.,	Pa.	G. A. Bachman.
Fischer, Albert Martin,	Philada.,	Pa.	G. W. Notson.
Fritsch, Harry,	Philada.,	Pa.	W. R. Warner & Co.
Gable, Ralph Benton,	Reading,	Pa.	Wm. Weis.
Gebhard, Adolph Emil,	Muskegon,	Mich.	J. Jesson.
Gehris, Peter Spang.	Reading,	Pa.	J. B. Raser.
Georges, Amandus George,	North Java,	N. Y.	H Opperman.
Giffin, Henry Riggeal,	Philada.,	Pa.	F. E. Morgan.
Green, Benj. Wallace,	Millington,	Md.	W. C. Ebaugh, M. D.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Griffin, Cyrus Byer,	Lewisburg,	Pa.	H. C. Watt.
Groom, Ellerslie Wallace,	Bristol,	Pa.	Dr. H. Pursell.
Groom, Joseph,	Philada.,	Pa.	Hance Bros. & White.
Haffa, George Adam,	Philada.,	Pa.	W. R. Warner & Co.
Hagenbuch, James Hervy,	Mahonoy City,	Pa.	C. C. Hagenbuch.
Hall, Jesse Barklay,	Norristown,	Pa.	Attwood Yeakle.
Hammond, Arthur Browne,	Baltimore,	Md.	E. Ball.
Hamilton, Will., Swearingen,	Fairmont,	W. Va.	Carr Bros.
Harper, Wm. Franklin,	Madison,	Ind.	J. E. C. F. Harper.
Harrington, Silas Marion,	Plano,	Texas.	S. J. Rogers, M. D.
Harris, Clinton Kelly,	Salem,	N. J.	J. T. Shinn.
Harris, Norton O.,	Dover,	Del.	S. Levin Dilks.
Hassler, Daniel Herr,	Carlisle,	Pa.	S. S. Bunting.
Haynsworth, Julius Dargan,	Darlington,	S. C.	Dr. J. A. Boyd.
Heider, Henry George,	Fon du Lac,	Wis.	G. Bille.
Heim, Henry Lewis,	Philada.,	Pa.	Aschenbach & Miller.
Henderson, James Ashton,	Maytown,	Pa.	Bullock & Crenshaw.
Heinitsh, Harry Ernest,	Philada.,	Pa.	J. P. Remington.
Herrman, Ralph Christian,	Allentown,	Pa.	A. Weber.
Hess, Edwin Hutter,	Harrisburg,	Pa.	Thomas Combs.
Hiestand, John Summy,	Mt. Joy,	Pa.	D. G. E. Musselman.
Howells, James Owen,	Bridgeport,	Conn.	F. Zimmer.
Hunter, James, Jr.,	Philada.,	Pa.	D. H. Ross.
Hunter, James Stanton,	Pittsburg,	Pa.	M. M. Schneider.
Hurd, George Edward,	Philada.,	Pa.	Dr. W. H. Jayne.
Jacobson, Frank Edward,	Bethlehem,	Pa.	C. Jacoby.
Jones, Harry Ellsworth,	Mt. Holly,	N. J.	J. J. Ottinger.
Johnson, Elmer Ellsworth,	Shenandoah	Pa.	S. C. Spalding.
Johnston, Frank Elmer,	Clifton Heights,	Pa.	H. M. Brennan.
Kalteyer, Moritz,	San Antonio,	Texas.	G. H. Kalteyer.
Keller, Alexander George,	Philada,	Pa.	G. H. Toboldt.
Ketcham, Stephen Rush,	Philada.,	Pa.	D. L. Stackhouse.
Keyes, Frank Williamson,	York,	Pa.	L. E. Sayre.
Kirk, Grant Elmer,	Philada.,	Pa.	J. W. Kohlerman.
Kirkham, Walter Agan,	Newark,	N Y.	M. M. Kenyon.
Kisner, Charles Nelson,	Berwick,	Pa.	R. H. Little.
Knight, Howard,	Bucks Co.,	Pa.	W. Procter, Jr. & Co.
Knisell, Sidney Lackey,	Woodbury,	N. J.	Bullock & Crenshaw.
Koch, Charles Herman,	Carlisle,	Pa.	J. T. Shinn.
Kuehnel, Gustav. Fred.,	Milwaukee,	Wis.	L. Oliphant.
Kunkel, Wm. Evans,	Harrisburg,	Pa.	H. C. Blairs' Sons.
Kyle, Elmer Bryan,	York,	Pa.	J. L. Bispham.
Kyner, James Almer,	Orrstown,	Pa.	J. C. Altick & Co.
Lammer, Francis Joseph, Jr.,	Philada.,	Pa.	J. Wyeth & Bro.
Landis, Frank Theodore,	Palmyra,	Pa.	Dr. W. C. Kline.
Lautenbacher, Irvin Lincoln,	Schuylkill Haven,	Pa.	H. C. Mohr.
Laval, Wm. John,	Evansville,	Ind.	J. Laval.
Lawrence, Samuel Comfort,	Attica,	N. Y.	Dr. Snitcher.
Lewis Llewellyn Hughes,	Chester,	Pa.	Lockard & Jones.
Lichtenburger, Fred'k Jacob,	Freeport,	Ill.	Fred. Weise.
Lochman, Chas. Napier,	Bethlehem,	Pa.	Simon Rau & Co.
McCarthy, Cornelius Joseph,	St. Clair,	Pa.	Bullock & Crenshaw.
McFarland, Thaddeus Day,	Hudson,	Ohio.	E. S. Bentley.
Maisch, Henry Charles Christian,	Philada.,	Pa.	Dr. L. Wolff.
Malatesta, Joseph Mark,	Philada.,	Pa.	J. H. Blake.
Mallon, James Peter,	Philada.,	Pa.	J. M. Fronefield.
Marbourg, John George,	Bedford,	Pa.	C. Shivers.
Matter, Robert Borton.	Lewistown,	Pa.	
Mauch, Chas. Milton, Jr.,	Hellertown,	Pa.	J. T. White.
May Rollin R.,	Wilmington,	Del.	G. W. Knight.
Mayer, Chas. Eugene,	Boyertown,	Pa.	L. Seifel.
Meissner, Paul Ernest,	Milwaukee,	Wis.	Baumbach & Rosenthal.
Mitcheson, Robt. Stockton Johnson,	Philada.,	Pa.	W. R. Warner & Co.
Moore, John Demuth,	Wrightsville,	Pa.	P. S. Brugh.
Morrett, Wm. Henry,	Mechanicsburg,	Pa.	J. A. Shelly.
Morrison, James,	Roxboro,	Pa.	W. M. Morrison.
Morse, Frank,	Hanover,	Ind.	G W. Kylius.
Moses, Matthew Ulysses S. Grant,	Trenton,	N. J.	R. H. Vansant.
Mount, Elmer Marshall,	Wilmington,	Del.	B. R. Veasey.
Moyer, Edwin Oliver,	Catasauqua,	Pa.	C. B. Lowe & Co.
Naudain, Edgar Harman,	Wilmington,	Del.	W. B. Danforth.
Nebig, Wm. George,	Philada.,	Pa.	C. C. Hughes.
Nebinger, Jacob Lewis,	Philada.,	Pa.	T. S. Wiegand.
Newton, John W.,	Gallipolis,	Ohio.	James H. Sanns.
Odenwelder, Harry S.,	Easton,	Pa.	R. Shoemaker & Co.
Pancoast George Widdifield,	Moorestown,	N. J.	J W. Worthington.
Parrish, Callistus Mitchell,	Ebensburg,	Pa.	William Lemmon, M. D.
Patterson, Albert Raymond,	Zanesville,	Ohio.	W. H Barnes.
Pechin, Edgar Vogan,	Philada.,	Pa.	G. H. Johnson.
Pechmann, Wm.,	Bremen,	Germany.	L. Dembinski.
Pemberton, Samuel Lovering,	Phil da.,	Pa.	Bullock & Crenshaw.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Peters, Leopold,	Fulton,	Ill.	Leslie Williams.
Pfaeffle, Robt Wm.,	Philada.,	Pa.	L. Wolff & Co.
Post, Philip Von Riper,	Philada.,	Pa	W. B. Webb & Co.
Purdy, Frank Vansant,	Doylestown,	Pa.	Dr. G. T. Harvey.
Ramey, Chas. Clifton,	Norristown,	Pa.	W. S. Thornley,
Read, Clinton Hubert,	Wattsburg,	Pa.	George Holland.
Reagan, Dennis.	Easton,	Pa.	H. G. Haring.
Rebner, Chas. Morris,	Atchison,	Kan.	McPike & Fox.
Rebsamen, Chas. Fred.,	Leavenworth,	Kan.	G. Ummethun.
Reese, Birch Taylor,	Philada.,	Pa.	W. R. Warner & Co.
Reinnoldt, Henry Otto,	Sheboygan,	Wis.	M. R. Zaegel & Co.
Reynolds, Walter,	Philada.,	Pa.	B. F. Sholl.
Rhodes, Chas. Henry,	Philada.,	Pa.	
Rhoads, Wm. Stevens.	Hontzdale,	Pa.	Dr. J. W. Rhoads.
Ridington, Wm. Augustus,	Conshohocken,	Pa.	William McKenzie, M. D.
Riggs, Elias Ellsworth,	Heightstown,	N. J.	Dr. G. E. Titus.
Roberts, Jos. Cuttell,	Wilmington,	Del.	Smith & Painter.
Rosenzweig, Benj.	Philada.,	Pa.	J. B. Moore.
Rossler, George Frederick,	Berlin,	Germany.	E. Jungman.
Santee, Andrew Curtin,	Town Line,	Pa.	W. C. Stillwell, M. D.
Saunders, Henry Scholey,	London,	Ontario (Can.)	Wm. Saunders.
Schaible, Emil,	La Fayette,	Ind.	E. B. Garrigues & Co.
Schlegel, Carl Edward,	Davenport,	Iowa.	Gus. Schlegel.
Schofield, Allen Curtis,	Piqua,	Ohio.	C. J. Biddle.
Schofield, Thos. La Blanc,	Philada.,	Pa.	Hance Bros. & White.
Schuchard, Herman Julius,	San Antonio,	Texas.	G. H. Kalteyer.
Scull, Andrew Stewart,	Atlantic City,	N. J.	Dr. M. West.
Schwartz, Fred.,	Philada.,	Pa.	E. W. Herrmann.
Seiler, Wm. Frederick.	Philada,	Pa.	B. W. Fetters.
Serfass, Abraham Lincoln,	Easton,	Pa.	C. Lawall & Son.
Shaw, Henry Clay,	Piedmont,	W. Va.	Dr. W. A. Shuey.
Sher, Fred. Paul,	Philada.,	Pa.	Dr. Sher.
Sinne, Hans Heinrich,	Germany,	Prussia.	Dr. A. Nebeker.
Smith, Christopher Columbus,	Philada.,	Pa.	J. F. Wilgus.
Smith, George Mark,	Annville,	Pa.	
Snavely, Harry Barr,	Lancaster,	Pa.	S. B. McCleary.
Snyder, Harry Lincoln,	Mechanicsburg,	Pa.	H. A. Borell.
Stager, Edwin Wesley,	Lebanon,	Pa.	J. S. Armstrong, M. D.
Stearns Moses,	Cincinnati,	Ohio.	C. A. Rutherford.
Steinecken, Geo. Augustus,	Wilmington,	Del.	Dr. W. S. Hitch.
Steinmetz, Wm. F.,	Philada.,	Pa.	M. G. Briggs.
Stermer, John Henry,	York,	Pa.	W. A. Burns.
Stichter, Henry D.,	East Greenville,	Pa.	E. B. Garrigues & Co.
Stiles, Henry Lippincott,	Moorestown,	N. J.	J. R. Stevenson.
Stinebeck, William Adam,	Columbia,	S. C.	Dr. D. S. Pope.
Stoll, Samuel Franklin,	Bucyrus,	Ohio.	C. A. Spence.
Strasser, John Jacob, Jr.,	Trenton,	N. J.	F. R. Jummel.
Swann, Samuel D.,	Fernandina,	Fla.	Horsey & Co
Swain, Harry,	Georgetown,	Del.	S. D. Marshall, M. D.
Tatem, Harry Randolph,	Collingwood,	N. J.	J. W. Lutz.
Thiebaud, Hugh McCallum,	Vevay,	Ind.	A. W. Peck.
Thompson, Wm. Cochran,	Coatesville,	Pa.	Dr. L. Wolff.
Thompson, George Washington,	Titusville,	Pa.	M. Goldsmith.
Tifft, Fred. Alden,	Camden,	N. J.	J. Griffith Howard.
Trefry, Thomas Crowell,	Yarmouth,	Nova Scotia.	Dr. C. A. Black.
Trout, Winfield Scott.	Philada.,	Pa.	W. R. Warner & Co.
Van Buskirk Samuel Levick,	Bethlehem,	Pa.	Van Buskirk & Apple.
Vannort, Wm. Augustus.	Hainesville,	Md.	
Von Achen, Frank Herman,	Peoria,	Ill.	F. C. Bourscheidt & Bro.
Waln, Chas. Herbert,	Yardville,	N. Y.	L. E. Sayre.
Ward, Joseph Poletus,	Gaston,	Ala.	L. A. Podolski.
Watson, Maurice,	Bristol,	Pa.	S. Douglass.
Webb, Richard John.	Scranton,	Pa.	J. L. Rea, M. D.
Webster, Samuel C.,	Philada.,	Pa.	S. C Webster.
Wegener, Henry,	Oshkosh,	Wis.	Geo. Phipps.
Weisel, Benjamin Franklin,	Elizabeth City,	N. C.	Wood & Wadsworth.
Wetteroth, Henry,	Bordentown,	N. J.	Bunting & Hankins.
Whilden, Chas. Bennett,	Charleston,	S. C.	G. I. McKelway.
Whitney, Heston,	Glassboro,	N. J.	J. G. Wells.
Wilkinson, Wm. John,	Philada.,	Pa.	C. A. Lang.
Williams Neri Barndt.	Easton,	Pa.	E. T. Meyers.
Windolph, J. Frederick,	Dover,	Del.	T. C. Tomlinson, M. D.
Wittiger, Hugo Otto,	Kutztown,	Pa.	M. Shoffner.
Wood, Alfred Conard,	Hatboro,	Pa.	T. L. Buckman.
Woodill, Robert Wellesley,	Halifax,	Nova Scotia.	Avery, Brown & Co.
Wright, James Edward,	Philada.,	Pa.	F. E. Himmelwright, M. D.
Yost, Wm. Oscar,	Norristown,	Pa.	W. Stahler.
Zieber, Paul,	Hanover,	Pa.	B. A. Hertsch.

Total, 240 11.